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An invetigation into the relationship between the reading ability of grade IX students and their achievement in each of two content fields.

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SYNOPSIS

This study seeks to investigate the relationship of reading ability to achievement in the content fields. In particular, it attempts to show how the reading ability of the Alberta Grade IX students was related to their success in the final examinations of June, 1950, in literature and in general science and health education. Its primary purpose is to determine whether reading ability may be considered to be an important factor in the academic achievement of Grade IX students; its secondary purpose is to see whether mental ability and vocabulary have something to do with the relationship.

The findings show that the results of the reading test were positively and rather highly correlated with the results in literature and that the correlation of the reading scores with the marks in general science and health education was lower, yet positive and substantial. As far as the group of students was concerned, good mental ability and good vocabulary were at least concomitant with success in literature and in general science and health education. The study is not adequate to permit the statement that vocabulary training would produce much of the success that appeared to come from reading ability; it only suggests that knowledge of vocabulary may be a partial cause of the relationship.

THE UNIVERSITY OF ALBERTA

AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN THE READING ABILITY OF GRADE IX STUDENTS AND THEIR ACHIEVEMENT IN EACH OF TWO CONTENT FIELDS

A DISSERTATION SUBMITTED
TO THE COMMITTEE ON GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE DEGREE OF
MASTER OF EDUCATION

FACULTY OF EDUCATION

BY
GEORGE HAROLD DAWE
RED DEER, ALBERTA
September, 1952

ACKNOWLEDGEMENTS

The Examinations Branch of the Department of Education supplied the sets of candidates' papers from which the primary data for the investigation were gathered and the copies of the tests included in Appendix B. For this assistance the writer is grateful. He would recognize, too, the help received from the committee who guided him in his work. He is particularly indebted to Dr. H. T. Coutts, who made the arrangements by which the raw data were obtained and who gave time most generously to advise the writer and to help him in his difficulties. Finally, there should be a word of appreciation to the writer's wife for the encouragement which she gave to him through the months of preparation of this thesis.

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CHAPTER I

PURPOSES OF THIS STUDY

Reading is now recognized as one of the most important skills developed in the schools. Indicative of this recognition is the large number of studies in reading. However, findings and opinions differ, and it is certain that the research is far from being complete.

Reading ability appears to be related to achievement in many of the content fields, but the degree of correlation and the influence of common elements in the relationships are not yet clearly defined. This study examines new data in an attempt to gain a better understanding of how important reading is to students' success in other subjects. Specifically the problem is to answer these questions:

1. To what extent were the scores in reading correlated with the scores in literature and in general science and health education in the final examinations of Grade IX students in Alberta schools in June, 1950?
2. How would these relationships be affected by holding mental ability and vocabulary constant?

CHAPTER II

LIMITATIONS OF THE STUDY

The main limitation of the study is the validity of the tests used. Lindquist[1] says, "The true validity of an educational or psychological test must always remain a hypothetical concept since there is never available an infallible criterion measure against which the fallible obtained measures may be evaluated." However, the examinations in reading, in literature, and in general science and health education were set by individuals considered by the Examinations Board of the Department of Education to be competent in this work. Davis[2] points out that the opinion of experts is an important check on validity and that statistical considerations alone are not enough in test construction. The Alberta test in reading not only had the approval of the Examinations Board, but it was checked in this study by comparison and by statistical analysis and found to be reasonably valid. The test of mental ability[3] is one widely used as a group test, and it is reported to compare favorably with other accepted tests of intelligence. That the examinations in literature and in general science

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[1]E. F. Lindquist, A First Course in Statistics, Houghton Mifflin Co., Riverside Press, Cambridge, Mass., 1938, p. 198.

[2]F. B. Davis, Item-Analysis Data, Harvard Papers on Education, No. 2, Graduate School of Education, Harvard University, Cambridge, Mass., 1946, p. 16.

[3]Henmon-Nelson Tests of Mental Ability, Grades 7 to 12, Form A, Houghton Mifflin Co., Chicago, Ill., 1950.

and health education were satisfactory measures of achievement is an assumption that rests on opinion alone.

A second limitation of the study comes from the procedures which it employs. The correlations of reading with achievement in literature and of reading with achievement in general science and health education indicate not only that there is a relationship, but they are also measures of it. Partial correlations, on the other hand, are more difficult to interpret. They may be useful in analyzing the relationships in a set of related variables,[4] but they must be used cautiously. They may reveal factors that are common to the related variates, but these factors are not necessarily the cause of the relationship. In this study the check on the partial correlations is a series of zero-order correlations worked on small groups in which the third variables - mental ability and vocabulary - are held within the range of a few points, but not with exact constancy. Consequently, the third variable remains a factor, even if it is a limited one, and holding this variable about one point on the scale that measures it does not give a result that is accurately representative of the relationship that might exist if the third variable were held at another point. In other words, the correlation between marks in reading and marks in science for students

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[4]Karl J. Holzinger, Statistical Methods for Students in Education, Ginn and Co., New York, 1928, p. 285.

of average mental ability would not necessarily be the same as it would be for students of superior mental ability. Yet probably one good feature of the procedures is that they are comparatively simple, and their results are readily translated into terms understood by persons with limited knowledge of statistics.

A third limitation of the investigation is that its findings pertain to the group, not to the individual. The correlations discovered in it may be a satisfactory indication of the relationship between the reading ability of a large group of Grade IX students and their achievement in literature and in science, and one may expect that, when the correlation is positive and substantial, the achievement of the good readers will be better than the achievement of the poor readers in these subjects. However, what applies to the group does not necessarily apply to the individual. In fact, the smaller the group, the more careful one must be in applying to it a generalization based on the correlations discovered in this study.

Another limitation of minor importance is the degree of accuracy obtained by the procedures used in calculating the coefficients of correlation. Most of the calculations are correct to two places of decimals, after the practice of Lindquist on his sample correlation chart.[5] Because of of the grouping there may be small discrepancies between

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[5]E. F. Lindquist, op. cit., addenda.

the results from correlation charts and those that would come from the ungrouped-data techniques. However, this study cannot pretend to discover the final degree of correlation. In view of the invalidities and unreliabilities that persist in educational and psychological tests it would be unrealistic to claim that the correlations between reading and literature and between reading and science scores would always be exactly the same as those discovered here.

CHAPTER III

A REVIEW OF LITERATURE RELATED TO THIS STUDY

The number of studies that have to do with reading in the content fields is very large. The study most pertinent to this thesis is that of Dr. H. T. Coutts.[1] Examining the results of the Grade IX examinations of 1949, he found that achievement in the content fields of literature, mathematics, science, and social studies was significantly related to reading ability. He concluded that there was a general reading factor common to all these content fields and that there were also reading abilities specific to them. Of particular interest is his finding that general content vocabulary was the only element of reading common to successful achievement in the content fields mentioned above. Reading, however, was not the only factor entering into the relationship. Sex differences and the size and nature of the school organization were also related to the scores made by the students on their examination papers.

Two Alberta studies, completed about the same time as that of Coutts, report somewhat different conclusions.

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[1] Herbert T. Coutts, The Relation between the Reading Competence of Alberta Ninth-Grade Pupils in Four Content Fields and Their Achievement in Those Fields. Unpublished Ph. D. Thesis, Graduate Faculty of the University of Minnesota, 1950.

W. E. Hodgson[2] found that the reading comprehension of the students in the Temporary-License Class of the Faculty of Education, University of Alberta, was a poor predictor of their academic averages in the teacher-training course. James M. Craig[3] in an investigation into the relationship between reading ability and knowledge of basic concepts in social studies of students in the Junior Elementary and Intermediate Program of the Faculty of Education, 1949-50, found the correlation to be low. His finding differs from Artley's[4] discovery of a coefficient of .79 between reading comprehension in social studies and general reading comprehension.

Undoubtedly explanations of the apparent differences in the conclusions of these studies could be made, but here attention is drawn to them only to show that the last word on the relationship between reading ability and academic success has not been said. A need for careful evaluation and interpretation of previous studies remains, and there is room for further investigation.

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[2]William E. Hodgson, Selection of Candidates for the Faculty of Education, University of Alberta, a Colloquium Paper Submitted to the College of Education of the University of Minnesota, 1951.

[3]James M. Craig, An Investigation into the Relationship between Mental Abilities, Reading Abilities, and Knowledge of Some Basic Concepts in Social Studies, M. Ed. Thesis, School of Graduate Studies, University of Alberta, Oct., 1950.

[4]A. S. Artley, "A Study of Certain Relationships Existing between General Reading Comprehension and Reading Comprehension in a Specific Subject-Matter Area," Journal of Educational Research, Vol. 37, Feb., 1944, pp. 464-465.

Some of the difficulty lies in the definition of just what constitutes reading ability.* Burkart,[5] from the opinions of one hundred and nine reading specialists, concludes that reading is a complex activity composed of at least two hundred and fourteen separate abilities. Strang[6] states that there is no unmistakable evidence of a general silent reading ability. Shores,[7] from a study of Grade IX students' ability to read science and history, believes that the results of his investigation offer rather conclusive evidence in refutation of the concept of a general reading ability in the ninth grade. Leary and Gray[8] consider reading to be a composite of many abilities. Yoakam[9] and Gates[10] regard reading as a very complex mental process.

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* Noted by Arthur I. Gates in "In Reading," Journal of Educational Research, Vol. 40, Jan., 1947, p. 383.

[5]Kathryn H. Burkart, "An Analysis of Reading Abilities," Journal of Educational Research, Vol. 38, Feb.,1945,pp.430-439.

[6]Ruth E. Strang, Improvement of Reading in High School and College, Second Edition, Science Printing Co., Lancaster, Penn., 1940, p. 327.

[7]J. H. Shores, "Skill Related to Ability to Read History and Science," Journal of Educational Research, Vol. 36, April, 1943, p. 590.

[8]Bernice E. Leary and William S. Gray, "Reading Problems in the Content Fields," Chapter V of Reading in General Education, by W. S. Gray. American Council on Education, Washington, D. C., 1940, p. 115.

[9]G. A. Yoakam, "The Essential Relationship between Reading and the Subject Fields or Areas of the Curriculum," Journal of Educational Research, Vol. 38, 1944-45, p. 462.

[10]Arthur I. Gates, "The Nature of the Reading Process," The Forty-Eighth Yearbook of the National Society for the Study of Education, Part II: Reading in the Elementary School, University of Chicago Press, Chicago 37, Ill., 1949, p. 3.

Yet Buswell says clearly:

> Psychologically reading is not a complicated situation. It is simply a process of interpreting a certain kind of visual experience in which conventional symbols on a printed page are substituted for the common objects in the environment. The interpretation depends on a broad understanding of the field.
>
> After a person has mastered the process of reading in those fields common to all people, nothing is gained by applying the term "learning to read" to the mastery of a new field. Mastering a new field is not learning to read; it is learning a new subject.[11]

But whether reading in a content field requires a particular reading skill or simply a background of suitable experience, there are studies to show that in some way or other reading is related to achievement in the content fields. Eva Bond[12] found that reading ability was definitely related to achievement in ninth-grade English and general science. She suggested that reading abilities as measured by standardized tests were more highly related to achievement in literary areas than to achievement in other subject-matter areas because children were taught to do the literary type of reading, which was less efficient in the other content fields.[13] Swenson,[14] working with Grade VIII students,

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[11] Guy T. Buswell, How Adults Read, Supplementary Educational Monographs, No. 45, Aug., 1937, University of Chicago, Chicago, Ill., 1937, pp. 144-145.

[12] Eva Bond, Reading and Ninth-Grade Achievement, Teachers College Contributions to Education, No. 756, Bureau of Publications, Teachers College, Columbia University, New York, 1938.

[13] ibid, p. 57.

[14] Esther J. Swenson, "A Study of the Relationships among Various Types of Reading Scores on General and Science Materials," Journal of Educational Research, Vol. 36, Oct.,1942,pp. 81-90.

discovered that the upper group in scores on a science reading test were definitely superior in total scores on the Traxler tests of reading. She eliminated the factors of intelligence and age by matching the students. Shores[15] found, by examining Grade IX students, that the ability to read science was significantly related to the total score in silent-reading comprehension as measured by the Iowa Every-Pupil Tests of Basic Skills. Aukerman[16] discovered that, when students of the eleventh grade were matched in intelligence, sex, color, age, half-grade, subject, hour of recitation, and teacher, there were still significant differences between the reading abilities of the good and the poor students in English, history, chemistry, and mathematics.

Gray, in his annual summaries published each February in the Journal of Educational Research, reports a number of investigations that show how reading is related to achievement in the content fields. In one study Anderson and Dearborn[17] found that there was a positive relationship between reading ability and college achievement of sixty-eight freshman, even when intelligence was not a factor.

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[15]J. H. Shores, op. cit., pp. 584-593.

[16]Robert C. Aukerman, "Differences in the Reading Status of Good and Poor Eleventh-Grade Students," Journal of Educational Research, Vol. 41; March, 1948, pp. 498-515.

[17]Journal of Educational Research, Vol. 35, Feb., 1942, p. 418.

Humber[18] discovered that, at the university level, scores on reading tests were more closely related to achievement in the humanities group than to achievement in those curricula emphasizing science. Townsend[19] found a substantial relationship between the reading ability and the scholastic achievement of pupils of Grades IV and VI in all subjects tested, except arithmetic. In a second study of both elementary and high-school children she found a substantial positive correlation between reading and academic aptitude. Traxler[20] also found a substantial relationship between reading ability and scholastic achievement of high-school students, but the correlations were lower than those for the younger children of Townsend's study. Traxler thought that the increasing number of factors entering into achievement in the higher grades might explain the difference.

Most of this evidence shows that ability in reading is either instrumental in the academic achievement of students or concomitant with it. As Strang[21] says, the relationship is positive, but not

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[18] Journal of Educational Research, Vol. 38, Feb., 1945, p. 414.

[19] Journal of Educational Research, Vol. 40, Feb., 1947, p. 414.

[20] Loc. cit.

[21] Ruth E. Strang, op. cit., p. 29.

invariably close. Correlations between scores on reading tests and various measures of scholarship range from those of comparative insignificance (such as those noted in the studies of Hodgson and Craig) to ones as high as .70 or better. Strang[22] reports that such correlations usually lie between .30 and .50. The degree of correlation depends greatly on the nature of the tests used, not only in rating scholastic achievement, but also in determining reading ability.

The validity of the tests used in measuring ability and achievement obviously has an important bearing on the results. Shores[23] feels that the reading tests for the intermediate grades and above should measure with materials chosen from a variety of content fields. If general reading ability is only a composite of specific reading skills, then one can understand why correlations are higher when the results of special reading tests, based on material from a specific subject field, rather than the results of "general reading" tests, are compared with academic grades in that subject field.[24] The nature of the tests used may account in large measure for the difference between the findings of Craig and Artley.

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[22] ibid, p. 30.

[23] J. H. Shores, "Some Considerations of Invalidities of General Reading Tests," Journal of Educational Research, Vol. 40, Feb., 1947, pp. 448-457.

[24] Ruth E. Strang, op. cit., p. 30.

Triggs[25] states that in general a test should use the sort of material that students meet in their course work, if the scores are to be a valid indication of how the students read in a normal study situation. She also notes the high correlation between results on some reading tests and scholastic aptitude tests, and asks, "Do these two types of tests measure different things or do they both measure merely a verbal skill which, according to Thurstone, is only one phase of mental ability? What is the relationship of this verbal skill to success in the educational curriculum?"[26]

Intelligence and reading ability appear to be very closely associated. Dolch[27] says that the degree of intelligence is the strongest single factor in the child's success in reading. Strang[28] says that the coefficients of correlation between reading-test scores and scores on group tests of mental ability are usually above .50. She reports findings by Gray and by Monroe that show relationships of this order.[29] She also suggests

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[25]Frances O. Triggs, Remedial Reading: A Diagnosis and Correction of Reading Difficulties at the College Level, University of Minnesota Press, Minneapolis, Minn.,1943, p. 41.

[26]ibid, p. 46.

[27]Edward W. Dolch, The Psychology and Teaching of Reading, Ginn and Co., New York, 1931, p. 139.

[28]Ruth E. Strang, op. cit., p. 31.

[29]ibid, p. 209.

that facility in the use of verbal symbols and in the apprehension of relationships may be the common basis of both intelligence-test scores and reading-test scores.[30] Abbott[31] found that an increase in the silent-reading ability of Grade IX students was accompanied by a significant increase in I. Q. as measured by the Kuhlmann test. McCullough[32] warns that, because of the influence of intelligence on reading ability and on achievement in school subjects, it is desirable to obtain the correlations by procedures that hold intelligence constant. "Partialling out" mental ability is a method of holding this factor constant when comparing reading ability with achievement in literature and in science. However, it is well to remember Strang's warning that it is more important to know how the student's intelligence functions in reading than to try to separate intelligence from reading ability. She says that intelligence and reading ability on the high-school level appear to be "inextricably associated."[33]

Vocabulary is a fair indication of academic aptitude, if not a perfectly reliable one,[34] and a good

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[31]Carlton E. Abbott, "Relationship between Variations in Silent Reading Ability and Mental Ability," Journal of Educational Research, Vol. 39, Dec., 1945, pp. 314-316.

[32]Constance M. McCullough, Ruth Strang, and A. E. Traxler, Problems in the Improvement of Reading, McGraw-Hill Book Co., Inc., New York, 1946, p. 157.

[33]Ruth E. Strang, op. cit., p. 31.

[34]George Spache, "The Vocabulary Tests of the Revised Stanford-Binet as Independent Measures of Intelligence," Journal of Educational Research, Vol. 36, March, 1943, pp. 512-516.

vocabulary is second only to word recognition in basic importance for good reading.[35] Gray[36] tells that Good-enough secured a coefficient of correlation of .79 between ability to understand and explain meanings of words and reading achievement. It is not surprising that Coutts[37] found knowledge of general vocabulary to be the only factor common to successful achievement in the four fields of literature, mathematics, science, and social studies when the effects of mental age and of chronological age were held constant. In comparing the scores on reading tests with scores on achievement tests it would be well to consider the effect of vocabulary as well as that of mental ability in establishing the correlations. As with mental ability, however, it must be remembered that vocabulary is an essential part of reading.

Partial correlations are a simple method of eliminating factors by means of formulas, but statisticians have noted certain dangers in the interpretation of results secured in this way. Garrett,[38] Lindquist,[39]

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[35]Frances O. Triggs, op. cit., p. 164.

[36]In Journal of Educational Research, Vol. 42, No. 6, Feb., 1949.

[37]Herbert T. Coutts, op cit., p. 164.

[38]H. E. Garrett, Statistics in Psychology and Education, Longmans, Green, and Co.,New York, 1947,pp.455-456.

[39]E. F. Lindquist, Statistical Analysis in Educational Research, Houghton Mifflin Co., New York, 1940, p. 251.

Odell,[40] and Burks[41] are four who issue warnings. Partial coefficients of correlation are based on the assumption that the zero-order coefficients have come from data in which the regression is linear. The validity of the test that measures a factor "partialled out" may be doubtful. Another danger is that "partialling out" the scores obtained from one of the tests may hold constant factors that are essentially part of the abilities measured by the other tests. In other words, the process may hold constant more than it should. Another difficulty of interpretation is that the factors eliminated by partial correlation may be causes or they may be only features in common without causal relationship. However, although the use of partial correlations has limitations, it may also be valuable in analyzing the relationships in a set of correlated variables.[42]

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[40]Charles W. Odell, Statistical Method in Education, D. Appleton-Century Co., Inc., New York, 1935, p. 278.

[41]Barbara S. Burks, "On the Inadequacy of the Partial and Multiple Correlation Technique," Journal of Educational Psychology, Vol. XVII, 1926, pp. 532-540 and 625-630.

[42]Karl J. Holzinger, Statistical Methods for Students in Education, Ginn and Co., New York, 1928, p. 285.

CHAPTER IV

SOURCES OF THE DATA AND DESCRIPTIONS OF THE TESTS

The three hundred and fifty-five sets of papers that were the main source of data for this study were drawn by the use of random numbers* from the examinations written by close to ten thousand Grade IX students in Alberta in June, 1950. Consequently, the results of the tests are representative of the work of both boys and girls attending small rural schools, village schools, consolidated schools, centralized divisional schools, and large urban schools. The scores on the mental-ability tests show that almost every level of intelligence of Grade IX students was represented.

The results of the Iowa Tests of Educational Development were obtained from Dr. Coutts, who had given these tests to Grade IX students in Wainwright, Vegreville, and the University Junior High Schools shortly before the final examinations of the Department of Education. The answer sheets completed by these students for the Department's test in silent reading were obtained from the Examinations Branch.

With the exception of the Iowa Tests used to check the validity of the Alberta test in silent reading, all

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*Described more fully in Chapter V.

tests were those prescribed by the High School Entrance Examination Board of the Department of Education and written by Grade IX students throughout the Province at the end of June, 1950.

1. The Henmon-Nelson Tests of Mental Ability,[1] Form A, were used to measure mental ability. Raw scores, not mental ages, were used in calculating coefficients of correlation.

The Teacher's Manual for this test gives the following information:

Correlation with Other Tests

Test	r	Grades	N
Otis Self-Administering Test (M. A.'s)	.777	8	235
Otis Self-Administering Test (M. A.'s)	.79	9B	57
Otis Self-Administering Test (Scores)	.810	13	65
Terman Group Test (M. A.'s)	.802	8	235
American Council Psychological Examinations (Scores)	.79	12	80
Kuhlmann-Anderson Test (I. Q.'s)	.84	8 & 9	89
Coefficient of Reliability in Grade 9	.893		
Probable Error of Raw Score in Grade 9	3.0		

The test consists of ninety items of the multiple-choice type. It has a machine-scored answer sheet. The time for the test is thirty minutes.

Howard Easley, Assistant Professor of Educational Psychology, Duke University, says, "The content and

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[1] Henmon-Nelson Tests of Mental Ability, Grades 7 to 12, Forms A, B, C, Houghton Mifflin Co., Chicago, Ill., 1931. (The 1950 edition was used in Alberta in June, 1950.)

standardization of these tests seem as satisfactory as those of the better group tests of intelligence, but not strikingly more so."[2]

2. The Alberta Literature Test* was Part I of the English examination set by the High School Entrance Examination Board for 1950. Its administration time was one hour. All work of the student was done in a question booklet. The total value of the items was seventy-seven.

It was assumed that the test in literature was a valid measure of the achievement of the Grade IX students in that subject. The programme of studies used in 1949-50 divided the course into two parts: intensive literature or the study of selections from the authorized reader, Modern Literature for Schools,[3] and extensive literature, comprising individual reading and free reading. Questions 3 and 4 of the test, together worth seventeen points, dealt with selections from the reader and with the students' individual reading of books listed in the programme.[4] The remainder of the examination, scored sixty points, was based on "sight" selections, and was designed to test the

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[2]The Nineteen Forty Mental Measurements Yearbook, Oscar Buros, editor. The Mental Measurements Yearbook, Highland Park, New Jersey, 1941, p. 222.

[3]H. R. Leaver, Modern Literature for Schools, The Copp Clark Co., Ltd., 1937.

[4]Programme of Studies for the Intermediate School and Departmental Regulations Relating to the Grade IX Examination, Authorized by the Department of Education, A. Shnitka, King's Printer, Edmonton, pp. 28-30.

*A copy of the test may be found in the Appendix.

students' ability to comprehend and to appreciate these selections. The test, therefore, was set in conformity with the regulations governing the Grade IX examination in literature,[5] and it had the approval of the Examination Board. Under these circumstances it is probably safe to assume that the scores on the test were a reasonably satisfactory measure of the Grade IX students' achievement in the 1949-50 course in literature.

The reliability of the test in literature by the split-halves technique and the Spearman-Brown formula was found to be .86.

3. The Alberta Test in General Science and Health Education* was also set by the High School Entrance Examination Board for 1950. The time allowed for the test was two and one-half hours. There were three sections:

Section A - 50 questions of the multiple-choice type, answered on a sheet for machine-scoring and covering a range of science and health facts;

Section B - 56 questions of the multiple-choice type, answered on the same sheet as Section A and requiring the student to select the idea or ideas related to sets of observations;

Section C - 56 points on a variety of questions, scored from an objective key.

It was assumed that the scores on this test were a valid measure of the students' achievement in general science

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[5] ibid, p. 14.

*A copy of this test may be found in the Appendix.

and health education. The Grade IX course in general science, outlined in the programme of studies for 1949-50, covered environment, air and its work, water and its work, heat and its work, light and its work, a study of industry, work of solar energy and its relation to living things, and safeguarding and improving the life of the individual and community. The subject content of the examination was within the limits of this broad outline. The outline for health education was suggestive only, but it was not unreasonable to expect a Grade IX student, after his work in Grades VII, VIII, and IX, to be familiar with the material on which the health-education items of the final test were based. The examination covered a wide range of general-science and health material on a level that should have been reached by Grade IX students, it was approved by the Examination Board, and, consequently, the assumption that it had satisfactory validity appears to be justified.

The reliability of the test by the split-halves technique and the Spearman-Brown formula was found to be .94.

4. Iowa Tests of Educational Development for Grades 9 to 13,[6] Form Y - 2.

These tests, administered to the Grade IX students of the Wainwright, Vegreville, and University Junior High Schools, were used to check the validity of the Alberta test

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[6] Iowa Tests of Educational Development for Grades 9-13, published by Science Research Associates, 228 So. Wabash Ave., Chicago 4, Ill., 1942.

in reading.

The following tests of the series were used:-

Test 4, Quantitative Thinking - 53 items, 65 minutes.

Of this test Henry Chauncey, President of the Educational Testing Service, Princeton, N. J., says, "The problem settings are realistic, and the quality of the items is good."[7]

Test 5, Ability to Interpret Reading Materials in Social Studies - 80 items, 60 min.

Test 6, Interpretation of Natural Sciences - 81 items, 60 min.

Chauncey says, "The passages, though individually good, are too largely drawn from the biological as opposed to the physical sciences."[8]

Test 7, Interpretation - Literature - 80 items, 50 min.

Chauncey says of this section, "The questions are good, calling for real literary interpretation."[9]

Test 8, General Vocabulary - 75 items, 22 min.

Froelich, of the Bureau of Institutional Research, University of Illinois, makes this comment on the series of tests: "From the standpoint of the more detailed aspects of test construction, the Iowa Tests of Educational

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[7] The Third Mental Measurements Yearbook, Oscar Buros, editor. Rutgers University Press, Rutgers College, New Jersey, 1949, pp. 24-25.

[8] Loc. cit.

[9] Loc. cit.

Development constitute an excellent battery."[10]

Reliability coefficients between Form X and Form Y are reported in the manual to be about .90.

5. The Alberta Reading Test, Grade IX, 1950.*

It was in booklet form with a machine-scored answer sheet. There were four parts:

Part I - Literary material;
Part II- Mathematical material;
Part III - Scientific material;
Part IV - Social-studies material.

Because it is essential to this study that the reading scores be a reasonably valid measure of reading ability, considerable care has been taken to check the validity of the reading test. The correlations between parts of the Alberta test in reading and the corresponding tests of the Iowa series are given in the following table. All of the coefficients are significant at the .01 level.

TABLE I

Relationship between Alberta Reading Test and Iowa Tests of Educational Development

Alberta Test	Iowa Test	r	S.E.	N
Part I (Lit.)	Test 7 (Lit.)	.71	.052	92
Part II (Math.)	Test 4 (Math.)	.65	.077	66
Part III (Science)	Test 6 (Science)	.69	.055	92
Part IV (S. St.)	Test 5 (S. St.)	.69	.055	92
Total Vocabulary	Test 8 (Vocab.)	.75	.046	92
Total, Parts I-IV	Total, Tests 4-8	.88	.096	66

[10] ibid, p. 26.

* A copy of this test may be found in the Appendix.

These substantial coefficients of correlation between the Alberta Reading Test and the Iowa Tests indicate that there is little reason to doubt the validity of the Alberta Test, particularly as far as vocabulary scores and total scores are concerned. However, because the validity of the criterion test is probably also imperfect, the validity of the test compared with it cannot be assessed with absolute accuracy in this way. Consequently, a second check by statistical consideration of the items was made on the Alberta Reading Test.

When the Davis item-analysis method* was applied to check the validity of the Alberta Reading Test it was found that only five items had discrimination indices below 20. (Items with indices above 20 are considered by Davis to be satisfactory.) One of the five, Item 38, had a discrimination index of plus 2. Both high and low groups found this item very difficult, probably because the dates in the test were not in chronological order. As its difficulty index of minus 30 indicates, the item was at fault in being too difficult for all students. Item 68 had a Davis discrimination index of minus 7, but on Flanagan's[11] chart the index was very slightly positive. The fact that economy increased as cost decreased apparently was overlooked by the students. On both Items 38 and 68

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[11]John C. Flanagan, "General Considerations in the Selection of Test Items and a Short Method of Estimating the Product-Moment Coefficient from Data at the Tails of the Distribution," Journal of Educational Psychology, Vol. 30, 1939, pp. 674-680.

*Described in Chapter V.

the highest 27% of the students had more "rights" than the lowest 27%. It is safe to say that, if these two items added nothing to the validity of the test, they hardly detracted from it. The indices of discrimination and of difficulty for all items are given in Table II, page 26. It is evident from these figures that the validity of the test as a whole was quite satisfactory, according to the Davis formula.

The reliability of the Alberta Reading Test was found by using the split-halves technique and the Spearman-Brown formula. The coefficient obtained in this way was .92.

TABLE II

Davis Item-Analysis:*Indices of Discrimination and of Difficulty for Items of the Alberta Reading Test, 1950

Item	Discrimination Index	Difficulty Index	Item	Discrimination Index	Difficulty Index	Item	Discrimination Index	Difficulty Index
1.	35	58	31.	29	47	61.	24	52
2.	41	27	32.	30	59	62.	27	36
3.	65	41	33.	29	48	63.	35	44
4.	35	44	34.	22	53	64.	32	56
5.	53	35	35.	32	47	65.	54	35
6.	47	30	36.	31	51	66.	63	56
7.	34	22	37.	35	63	67.	44	52
8.	40	41	38.	2	-30	68.	-7	0
9.	38	25	39.	50	33	69.	49	41
10.	49	32	40.	52	34	70.	48	31
11.	27	70	41.	24	61	71.	27	48
12.	37	61	42.	35	27	72.	35	42
13.	51	43	43.	35	59	73.	37	60
14.	26	51	44.	40	46	74.	24	55
15.	63	40	45.	16	53	75.	47	44
16.	27	55	46.	31	69	76.	24	53
17.	28	32	47.	44	29	77.	27	60
18.	43	65	48.	64	44	78.	35	59
19.	54	42	49.	54	64	79.	29	70
20.	62	40	50	16	63	80.	43	47
21.	24	40	51.	59	56	81.	15	44
22.	69	45	52.	53	34	82.	29	41
23.	26	44	53.	40	54	83.	48	31
24.	27	75	54.	41	73	84.	56	37
25.	33	21	55.	28	59	85.	53	49
26.	23	49	56.	32	67	86.	51	47
27.	46	45	57.	61	49	87.	31	72
28.	22	63	58.	26	47	88.	42	68
29.	26	60	59.	26	50	89.	37	53
30.	21	63	60.	24	33	90.	34	54
						91.	57	37

*F. B. Davis, Item-Analysis Data: Harvard Papers on Education, No. 2, Graduate School of Education, Harvard University, Cambridge, Mass., 1946.

CHAPTER V

PROCEDURE FOLLOWED IN THIS STUDY

1. Selection of data.

The random numbers used in the selection of sets of examination papers came from Statistical Tables for Biological, Agricultural, and Medical Research[1] by Fisher and Yates. The Examinations Branch of the Department of Education matched these numbers with the numbers given to the sets of papers written by the candidates in the Grade IX examinations of June, 1950. Three hundred and fifty-five sets of papers were made available on this basis. They were the random sample that represented in this study the results of the Grade IX examinations throughout the Province. The sets of papers written by the Grade IX students of Wainwright, Vegreville, and University Junior High Schools in the June examinations were also received from the Examinations Branch so that their scores on the Alberta Reading Test might be compared with the students' scores on the Iowa Tests of Educational Development.

2. Recording the data.

Raw scores made by the three hundred and fifty-five candidates on the following tests were recorded:

Alberta Reading Test, including each of its parts and the vocabulary sections;

Alberta Literature Test;

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[1] R. A. Fisher and F. Yates, Statistical Tables for Biological, Agricultural, and Medical Research, Oliver and Boyd, London, 1925.

Alberta Test in General Science and Health Education; Henmon-Nelson Test of Mental Ability, Form A.

The first hundred random numbers of the three hundred and fifty-five from Fisher and Yates were used to select a random sample of one hundred sets of papers. The hundred papers in each of reading, literature, and general science and health education were scored on their comparable halves, and the results were recorded for use in calculating the reliability coefficients.

The scores on the Alberta Reading Test made by the students of Wainwright, Vegreville, and University Junior High Schools along with the scores made by these students earlier in June on Tests 4 to 8 of the Iowa Tests of Educational Development were recorded separately for use in checking the validity of the Alberta Reading Test.

3. Finding reliabilities.

The split-halves technique was used in finding the reliabilities of the Alberta tests. Although Cronbach[2] believes that every test should be split at least two ways, Read[3] found that the differences between reliability coefficients obtained by various methods of selecting the chance halves were small. In this study an attempt was made to have comparable halves, but the tests were split in one way only.

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[2]Lee J. Cronbach, "A Case Study of the Split-Half Reliability Coefficient," Journal of Educational Psychology, Vol. 37, 1946, pp. 473-480.

[3]Cecil B. Read, "A Note on Reliability by the Chance-Halves Method," Journal of Educational Psychology, Vol. 30, 1939, pp. 703-704.

In the reading and in the literature tests the items were alternately thrown to the left and to the right to give the halves. In the test of science and health education the split was arranged to distribute evenly the possible marks on health.

The Spearman-Brown formula was used:

$$r_{1I} = \frac{2r_{\frac{1}{2}\frac{I}{II}}}{1 + r_{\frac{1}{2}\frac{I}{II}}}$$

r_{1I} = reliability coefficient of the whole test.

$r_{\frac{1}{2}\frac{I}{II}}$ = reliability coefficient of one-half of the test found experimentally. In this study it was the correlation of one-half with the other.

4. Testing the validity of the Alberta Reading Test.

(a) By correlation with the Iowa Tests of Educational Development.

The coefficients of correlation obtained in this check on validity are given in Table I, page 23. They were calculated by using the formula for ungrouped data, which is given in Section 5 of this chapter. The scores on Test 4 (mathematical material) of the Iowa series were not available for the students of the University Junior High School.

(b) By use of the Davis[4] item-analysis technique.

An index of discrimination for each item is read

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[4]F. B. Davis, Item-Analysis Data: Computation, Interpretation, and Use in Test Construction, Harvard Educational Papers, No. 2, Graduate School of Education, Harvard University, Cambridge, Mass., 1946.

from the Davis item-analysis chart once the values for P_H and P_L have been obtained by using the following formulas:

$$P_H = \frac{R_H - \frac{W_H}{K - 1}}{N_H - NR_H}$$

$$P_L = \frac{R_L - \frac{W_L}{K - 1}}{N_L - NR_L}$$

where

P_H = proportion of successes in highest 27% of the sample.

N_H = number of testees in the highest 27% of the sample.

R_H = the number of testees in the highest 27% of the sample who answered the item correctly.

W_H = the number of testees in the highest 27% of the sample who answered the item incorrectly.

NR_H = the number of testees in the highest 27% of the sample who did not reach the item in the time limit.

P_L = proportion of successes in lowest 27% of the sample.

N_L = number of testees in the lowest 27% of the sample.

R_L = the number of testees in the lowest 27% of the sample who answered the item correctly.

W_L = the number of testees in the lowest 27% of the sample who answered the item incorrectly.

NR_L = the number of testees in the lowest 27 % of the sample who did not reach the item in the time limit.

K = the number of choices in the item.

Briefly the Davis method is based on the idea that an item has discrimination, if the high-scoring group on

the total test are predominantly correct in their answers of the item, while the low-scoring group's answers are predominantly incorrect. The item has no discrimination, if equal proportions of the two groups answer it correctly. If the low-scoring group answers more correctly than the high-scoring group, then the item is negative in its discrimination. In other words, the discriminatory power of an item is checked by comparison with the results of the whole test.

Davis introduces certain refinements of this basic idea. Following Kelley's lead, he uses the highest 27% and the lowest 27% of the sample for his two groups. He corrects for chance answers in multiple-choice items by using $R - \frac{W}{K - 1}$ in the numerator of his formula, and he takes into consideration the items not reached in the time limit by using N - NR in the denominator. The terms in these two corrections have been explained in the first part of this sub-section where the main formulas are given.

The Davis discrimination index for each item of the Alberta Reading Test is given in Table II, page 26. The higher the index, the better is the discriminatory power of the item. The indices of difficulty given in the same table indicate in the reverse order of the numbers the relative difficulty of the items. In other words, the lower the index of difficulty, the more difficult is the item.

5. Finding the correlations.

The Pearson coefficient of correlation was found in two ways:-

(a) The formula[5] for ungrouped data was used in calculating these relationships:

Correlations between the tests of the Iowa series and the corresponding parts of the Alberta Reading Test;

Correlations between the Alberta Reading Test and each of the Alberta Literature Test and the Alberta Test of General Science and Health Education;

Correlations between halves of tests for which reliability coefficients were sought.

The formula follows:

$$r = \frac{XY - \frac{(\Sigma X)(\Sigma Y)}{N}}{\sqrt{X^2 - \frac{(\Sigma X)^2}{N}}\sqrt{Y^2 - \frac{(\Sigma Y)^2}{N}}}$$

A Remington Calculating Machine was used with this formula.

(b) For all other correlations of zero order the Lindquist Correlation Chart was used.

The standard error of the coefficient was found in all instances by use of the formula[6]:

$$S.E. = \sigma_r = \frac{1 - r^2}{\sqrt{N - 1}}$$

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[5]Helen Walker, Elementary Statistical Methods, Henry Holt and Co., New York, 1943, p. 241.

[6]ibid, p. 247.

6. Finding partial coefficients of correlation.

The formula[7] $r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{1 - r^2_{13}}\sqrt{1 - r^2_{23}}}$

was used when one factor (3) was to be held constant.

The formula[8] $r_{12.34} = \frac{r_{12.3} - r_{14.3}r_{24.3}}{\sqrt{1 - r^2_{14.3}}\sqrt{1 - r^2_{24.3}}}$

was used when two factors, (3) and (4), were to be held constant.

In "partialling out" vocabulary the total scores on the vocabulary sections of the Alberta Reading Test were taken as the measure of vocabulary. The scores used to measure reading ability in this part of the procedure did not include the vocabulary scores. In other words, the vocabulary sections of the four parts of the Alberta Reading Test were used as a test distinct from the remainder of the reading test.

7. The significance of the correlations.

The significance of the coefficients of correlation, including partial coefficients,[9] was checked by reference to Table 49, page 299, of Garrett's Statistics in Psychology and Education. This method is the equivalent of using the

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[7] H. E. Garrett, Statistics in Psychology and Education, Longmans, Green, and Co., New York, 1947, p. 410.

[8] ibid, p. 415.

[9] ibid, p. 417.

formula,[10] $t = \frac{r}{\sqrt{1 - r^2}} \cdot \sqrt{N - 2}$, and substituting

t = 1.96 at the .05 level and t = 2.58 at the .01 level. For zero-order coefficients the degrees of freedom are N - 2. For partial coefficients of correlation the degrees of freedom are N - m , where N equals the number of cases and m equals the number of variables entering into the correlation.[11] An adaptation of Table 49 to meet the needs of this study follows. Values of r significant at the .05 level and the .01 level for degrees of freedom 42, 48, 66, 69, 92, 351, 352, and 353 are interpolated.

TABLE III

Correlation Coefficients at the 5% and 1% Levels of Significance					
Degrees of freedom	.05	.01	Degrees of freedom	.05	.01
40	.304	.393	90	.205	.267
42	.298	.385	92	.203	.264
45	.288	.372	100	.195	.254
48	.280	.363	300	.113	.148
60	.250	.325	351	.105	.138
66	.239	.311	352	.105	.138
69	.234	.304	353	.105	.138
70	.232	.302	400	.098	.128

8. Linearity of regression was assumed after inspection of the correlation charts. Usually mental and educational

[10] E. F. Lindquist, Statistical Analysis in Educational Research, Houghton Mifflin Co., New York, 1940, p. 211.

[11] H. E. Garrett, op. cit., p. 417.

tests,when administered to large numbers of students, show linear or approximately linear relationship.[12] Non-linearity, if it were present, would make the correlation coefficients an underestimation of the strength of the relationships.[13] Because there was little reason to doubt the linearity of regression in the relationships of primary importance in this study, no mathematical test of linearity was used.

9. Except for the Iowa Tests, for which standard scores were provided by the Science Research Associates' marking service, raw scores were used in determining the relationships.

10. In general, calculations are correct to two places of decimals only. Values of $\sqrt{1 - r^2}$ were taken from Table 60 of Garrett's Statistics in Psychology and Education.[14]

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[12] ibid, p. 373.

[13] Helen Walker, op. cit., p. 258.

[14] H. E. Garrett, op. cit., p. 416.

CHAPTER VI

RESULTS OF THE STUDY

1. Scores on the Alberta Reading Test and on the examinations in literature and in science and health education were positively and significantly correlated.

The coefficient of correlation between reading and literature was .79. The standard error of the coefficient was ± .020. Corrected for attenuation the coefficient was .89. In terms of verbal description this correlation was high.[1]

The coefficient of correlation between the scores on the Alberta Reading Test and the scores on the examination in general science and health education was .67. The standard error of this coefficient was ± .029. Corrected for attenuation the coefficient was .72. These figures indicate a substantial correlation.[2]

2. Mental ability appeared to influence the scores in reading, in literature, and in general science and health education. It was substantially correlated with each of these subjects as Table IV shows. If the Henmon-Nelson Test of Mental Ability is correctly described as a group test of academic aptitude,[3] then the high correlation between the scores on it

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[1] H. E. Garrett, Statistics in Psychology and Education, Longmans, Green, and Co., New York, 1947, p. 333.

[2] Loc. cit.

[3] The Nineteen Forty Mental Measurements Yearbook, Oscar Buros, editor. The Mental Measurements Yearbook, Highland Park, New Jersey, 1941, p. 222.

and reading scores is to be expected. Strang[4] reports that the coefficients of correlation between group tests of intelligence and tests of silent reading hover around .60 and .70.

TABLE IV

Relationship of Mental Ability to Reading, Literature, and General Science and Health Education

Related Scores	r	S. E.	N
Reading and mental ability	.76	±.022	355
Literature and mental ability	.66	±.030	355
Science and health education and mental ability	.60	±.034	355

When mental ability was"partialled out" the correlation of reading with the other subjects dropped sufficiently to suggest that mental ability had influenced the original relationships. The partial coefficients are given below:

Correlation between reading and literature .59

Correlation between reading and general science and health education .41

When mental ability was held to a limited range the coefficients of correlation between reading and literature and between reading and science and health dropped appreciably from the original figures of .79 and .67. As one might expect,

[4]Ruth E. Strang, Problems in the Improvement of Reading in High School and College, Revised Edition, Science Press Printing Co., Lancaster, Penn., 1940, p. 209.

these coefficients did not agree exactly with the figures obtained by "partialling out" mental ability. There are two reasons for the differences: the small sample within the limited range and the particular location of the limited range within the full range of scores in mental ability. The fact that there are these slight differences suggests the possibility that the correlation between reading and the other subjects might vary from one level of mental ability to another. Because of the small number of cases at one level, particularly towards the extremes of the range of mental ability, it was not feasible in this study to investigate fully the possibility of such variations in the relationship of reading to academic achievement. Table V shows the results that were obtained when mental ability was limited to a few points near the arithmetic mean of the distribution of the scores in mental ability.

TABLE V

Relationship of Reading to Literature and to General Science and Health Education When the Range of Mental Ability Is Limited

Mental Ability (Raw Score)	Measures Correlated	r	S. E.	N
48-52 (incl.)	Reading and literature	.54	.086	69
48-52 (incl.)	Read.& science & health	.47	.095	69
43-47 (incl.)	Read.& science & health	.38	.103	70
49-51 (incl.)	Read.& science & health	.39	.133	42

All these correlations are significant at the .01 level.

3. Knowledge of general vocabulary appeared to be related positively to each of reading, literature, science and health education, and mental ability. In the correlations given in Tables VI and VII the measure of reading ability does not include the vocabulary sections of the four parts of the Alberta Reading Test, and the total score on the vocabulary sections is used as the measure of general vocabulary.

TABLE VI

Relationship between Reading (without Vocabulary Sections) and Each of Literature, Science and Health, and Mental Ability

Scores Correlated	r	S.E.	N
Reading (without vocab. section) and literature	.71	.027	355
Reading (without vocab. section) and general science and health education	.55	.037	355
Reading (without vocab. section) and mental ability	.72	.026	355

All correlations are significant at the .01 level.

TABLE VII

Relationship between General Vocabulary and Each of Reading, Literature, Science and Health, and Mental Ability

Scores Correlated with General Vocabulary	r	S.E.	N
Reading (without vocabulary sections)	.70	.027	355
Literature	.74	.024	355
Science and health education	.69	.028	355
Mental ability	.68	.029	355

All correlations are significant at the .01 level.

It may be noted in Table VIII that the coefficients of correlation are lower when the vocabulary sections are omitted from the measure of reading ability.

TABLE VIII

Comparison of Correlations When Measure of Reading Ability Includes of Excludes Vocabulary Sections of Reading Test

Related Measure	Reading Score Including Vocabulary Sections r	Reading Score Excluding Vocabulary Sections r
Literature test	.79	.71
Science-and-health test	.67	.55
Mental-ability test	.76	.72

When vocabulary was "partialled out" and when it was limited to a range of two points the coefficients of correlation between reading (without the vocabulary sections) and the other subjects dropped noticeably, as Table IX shows.

TABLE IX

Effect of Holding Vocabulary Constant and of Limiting Its Range

Scores Correlated	Total "r"		Vocab. Constant Partial "r"		Vocabulary Raw Scores at 21,22 Total "r"		
	r	N	r	N	r	S.E.	N
Reading (without vocab.) & literature	.71	355	.40	355	.38	.125	48
Read. (without vocab.) and science and health	.55	355	.14*	355	.20**	.140	48
Reading (without vocab.) and mental ability	.72	355	.46	355			

*Barely significant at .01 level. **Not significant.

The coefficients of correlation were reduced more by holding vocabulary constant than by holding mental ability constant. The differences may be seen in Table X.

TABLE X

Comparison of Partial Coefficients of Correlation When Mental Ability Is Held Constant and When Vocabulary Is Held Constant			
Scores Correlated		Mental Ability Constant	Vocabulary Constant
	N	Partial "r"	Partial "r"
Reading(without vocabulary) and literature	355	.44	.40
Reading(without vocabulary) and science and health	355	.22	.14

4. Further partial coefficients of correlation, all obtained when mental ability was held constant, are given in Table XI.

TABLE XI

Partial Coefficients of Correlation When Mental Ability Is Held Constant. N = 355.	
Scores Correlated	Partial "r"
Total vocabulary and science and health	.48
Total vocabulary and literature	.53
Total vocabulary and reading(without vocab.)	.42
Reading (without vocab.) and literature	.44
Read.(without vocab.)and science & health	.22
Reading (with vocab.) and literature	.59
Reading(with vocab.)and science and health	.41
All these correlations are significant at .01 level.	

5. When both mental ability and vocabulary were held constant the partial coefficient of correlation between scores on the reading test (without the vocabulary sections) and the scores on the literature test dropped to .29. The partial coefficient of correlation between reading (without the vocabulary sections) and achievement in general science and health education fell to .03 when both mental ability and vocabulary were "partialled out."

Table XII shows the effect of mental ability and of vocabulary, singly and together, in the relationship between the scores on the reading test (without the vocabulary sections) and the scores on the literature test and the test of general science and health education.

TABLE XII

Effect of Holding Mental Ability and Vocabulary Constant, Separately and Together. N = 355.

Measures Correlated with Reading (without vocabulary)	Total "r"	Mental Ability Constant Partial"r"	Vocabulary Constant Partial"r"	Mental Ability and Vocabulary Constant Partial"r"
Literature	.71	.44	.40	.29
Science and health	.55	.22	.14	.03

The partial "r" between reading (without the vocabulary sections) and literature, when both mental ability and vocabulary were held constant, was .29. Although this

figure is significant at the .01 level, it indicates only a slight correlation. It would appear that mental ability and vocabulary had much to do with the positive relationship between reading ability and achievement in literature, but possibly other unidentified factors entered into the relationship.

The partial "r" between reading (without the vocabulary sections) and general science and health education was only .03 when both mental ability and vocabulary were "partialled out." Of course, this coefficient is quite without significance. It is possible that mental ability and knowledge of general vocabulary were mainly responsible for the total "r" between reading ability and achievement in science and health. However, a decrease in the coefficient of correlation when factors are "partialled out" does not necessarily establish causal relationship. Perhaps mental ability and knowledge of general vocabulary were only features concomitant with reading ability and achievement in science and health. In addition, it must be remembered that vocabulary and mental ability as they were measured in this study may not be distinct factors and that holding them constant by "partialling out" may be eliminating factors that are not identified. Despite such caution in drawing conclusions, it is fairly safe to assume that the children of better mental ability would be, as a consequence of this ability, better in reading and in science. On the other hand, it would be

wise for a person to determine experimentally whether improved general vocabulary brings improved marks in general science before he assumes that vocabulary was a distinct causal factor in the relationship discussed here.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions.

1. The Alberta Reading Test of 1950 was a satisfactory measure of silent-reading ability.

2. Reading ability appeared to be significantly related to the success of the Grade IX students in literature and in general science and health education. General reading ability was more closely related to achievement in literature than to achievement in general science and health education.

3. Mental ability was a factor common to reading ability, achievement in literature, and achievement in general science and health education.

4. Knowledge of general vocabulary was positively and substantially related to reading ability, to achievement in literature, to achievement in general science and health education, and to mental ability. The relationship between general vocabulary and achievement in general science and health education was just as close as the correlation between the scores on the complete reading test and those on the test in science and health education. Vocabulary and literature were almost as closely related as reading and literature. Coefficients, all above or only slightly below .70, indicate that the correlation between general vocabulary and each of

reading, literature, science and health, and mental ability might be described as "very substantial" or "high."[1]

B. Recommendations.

1. Educators concerned with the junior high school should recognize that reading ability is closely related to the achievement of Grade IX students in literature, in general science, and probably in other content areas. Continued research into the nature of the relationship is desirable to determine what advantage of it may be taken by teachers and students. Instruction time spent in developing a general reading ability for the purpose of improving the students' achievement in a content field may, or may not, bring commensurate returns, but one may expect that teaching reading in a particular subject area will result in a significant improvement of knowledge in that area.[2] Often rather elaborate lists of specific skills are given for reading in a special content field, but, as Gray[3] suggests, there is need for further study to determine whether instruction in the various reading abilities has to be as

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[1]H. E. Garrett, Statistics in Psychology and Education, Longmans, Green, and Co., New York, 1947, p. 333.

[2]Paul B. Jacobson, "The Effect of Work-Type Reading Instruction Given in the Ninth Grade," The School Review, Vol. 40, Jan. to Dec., 1932, University of Chicago Press, Chicago, Ill., 1932.

[3]Bernice E. Leary and William S. Gray, "Reading Problems in the Content Fields," Chapter V of Reading in General Education, by W. S. Gray. American Council on Education, Washington, D. C., 1940, p. 132.

complicated as it sometimes tends to be.

2. The close association of general vocabulary with reading and with achievement in the content fields should also be recognized. Again further investigation is desirable,
(a) to determine whether or not vocabulary is truly a causal factor in the relationship, and
(b) to learn to what extent and in what manner vocabulary training can be used to develop reading ability* and to effect improved achievement in a content field.

Merely teaching words is hardly teaching reading.[4] Yet there is sufficient evidence in this study and in others that are described in Chapter III to suggest that the extent of a student's vocabulary may have much to do with his success, not only in reading, but also in the content fields. Teachers and students may well become "word conscious."

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[4]Glenn M. Blair, Diagnostic and Remedial Teaching in Secondary Schools, The Macmillan Co., New York, 1947,p. 93.

*Gray and Holmes found that the direct method of teaching vocabulary not only was superior to the incidental method, but it produced positive and greater gains in reading efficiency. They were working with pupils in Grade IV, who at this level might be, or might not be, more dependent on direct teaching of vocabulary than would Grade IX students.
William S. Gray and Eleanor Holmes, The Development of Meaning Vocabularies in Reading, University of Chicago, Chicago, Ill., 1938, pp. 58 and 77.

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APPENDIX A

RAW DATA AND ITS DISTRIBUTION

TABLE XIII

RAW SCORES IN READING, SCIENCE AND HEALTH, LITERATURE AND MENTAL ABILITY

	Random No. Candidate's No. (1)	Part I, Reading. (2)	Part II, Reading. (3)	Part III, Reading. (4)	Part IV, Reading. (5)	Total, Reading. (6)	Total, Vocabulary (7)	Reading without Vocab. (8)	Science and Health (9)	Literature (10)	Mental Ability (11)
1.	18	11	10	17	16	54	23	31	85	51	42
2.	25	9	13	14	9	45	22	23	92	31	42
3.	51	6	6	7	7	26	11	15	70	21	47
4.	60	10	14	18	19	61	24	37	122	51	61
5.	104	13	17	18	17	65	27	38	99	55	63
6.	143	20	19	21	20	79	36	43	130	65	73
7.	145	12	14	19	10	55	27	28	97	57	57
8.	147	10	15	18	12	55	27	28	122	51	51
9.	220	7	5	9	7	28	13	15	78	31	36
10.	230	9	9	11	12	41	19	22	64	29	44
11.	235	8	12	10	12	42	19	23	57	37	50
12.	294	19	17	18	18	72	31	41	124	62	60
13.	138	19	15	23	20	77	34	43	122	60	67
14.	404	7	10	7	10	34	14	20	52	32	54
15.	418	15	12	15	15	57	23	34	101	52	60
16.	419	15	10	17	16	58	28	30	103	64	50
17.	549	12	9	19	14	54	23	31	113	60	65
18.	562	10	10	15	12	47	18	29	78	34	60
19.	572	14	14	16	18	62	24	38	107	55	70
20.	576	5	11	12	13	41	20	21	114	45	40
21.	586	7	2	11	8	28	8	20	41	26	43
22.	600	7	9	12	15	43	17	26	58	52	48
23.	644	10	9	13	9	41	19	22	65	37	52
24.	660	16	11	17	16	60	31	29	88	52	45
25.	736	11	12	13	14	50	20	30	113	45	46
26.	810	11	19	18	15	63	29	34	102	48	63
27.	856	12	10	12	15	49	24	25	85	42	53
28.	890	10	16	16	16	58	24	34	123	42	63
29.	938	14	12	16	17	59	25	34	70	51	51
30.	959	8	9	9	15	41	17	24	64	44	46
31.	977	22	22	23	23	90	40	50	142	70	86
32.	984	17	12	13	18	60	25	35	56	53	56
33.	985	11	8	16	21	56	26	30	105	53	49
34.	1021	12	7	12	18	49	15	34	71	43	41
35.	1037	4	9	11	14	38	22	16	81	36	43

APPENDIX A

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
36.	1039	13	15	14	17	59	26	33	80	49	42
37.	1122	7	12	14	15	48	21	27	89	44	37
38.	1153	15	15	21	16	67	32	35	130	65	66
39.	1250	8	9	5	6	28	11	17	47	32	45
40.	1263	13	16	19	19	67	27	40	93	41	64
41.	1299	13	8	13	13	47	23	24	61	28	52
42.	1334	15	18	17	19	69	33	36	115	58	63
43.	1395	11	9	16	18	54	24	30	73	42	44
44.	1469	15	16	16	16	63	26	37	113	40	61
45.	1484	8	11	18	9	46	19	27	95	42	55
46.	1487	10	9	16	12	47	20	27	103	39	52
47.	1524	5	9	2	7	23	15	8	66	31	41
48.	1531	13	15	17	15	60	28	32	103	52	66
49.	1611	4	11	15	17	47	26	21	94	43	45
50.	1691	4	7	11	9	31	14	17	70	25	37
51.	1735	9	15	18	12	54	26	28	111	50	55
52.	1740	17	14	21	9	61	35	26	125	57	59
53.	1742	10	11	10	9	40	23	17	84	40	52
54.	1743	10	10	15	5	40	24	16	105	40	41
55.	1745	9	13	14	10	46	20	26	82	46	49
56.	1755	14	13	17	16	60	27	33	92	48	50
57.	1827	12	10	12	7	41	16	25	50	41	36
58.	1840	5	9	11	10	35	13	22	62	50	52
59.	1931	5	9	15	13	42	17	25	70	42	44
60.	1937	5	4	5	4	18	8	10	96	28	38
61.	1980	7	7	17	6	37	17	20	104	49	53
62.	1983	8	11	17	13	49	26	23	112	51	39
63.	2048	10	15	20	14	59	29	30	129	53	61
64.	2067	6	9	11	15	41	20	21	86	52	51
65.	2134	17	16	19	17	69	29	40	122	58	50
66.	2162	6	9	17	13	45	22	23	68	47	42
67.	2177	10	9	11	9	39	18	21	76	42	48
68.	2200	7	9	12	5	33	19	14	62	27	29
69.	2202	13	17	17	21	68	32	36	112	54	58
70.	2218	9	14	14	12	49	22	27	89	33	51
71.	2273	6	7	10	12	35	18	17	92	22	43
72.	2395	8	9	12	14	43	23	20	110	46	49
73.	2402	10	13	14	12	49	27	22	88	44	55
74.	2405	20	21	19	20	80	37	43	129	68	77
75.	2410	16	17	19	17	69	33	36	140	58	65
76.	2416	6	13	15	13	47	22	25	94	50	64
77.	2419	15	17	20	16	68	29	39	106	61	62
78.	2453	20	16	20	22	78	34	44	117	72	75
79.	2466	7	10	13	14	44	18	26	72	44	51
80.	2501	6	8	15	8	37	20	17	71	29	37

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
81.	2562	19	16	21	23	79	38	41	108	63	70
82.	2609	5	11	12	10	38	16	22	55	35	40
83.	2634	15	17	20	17	69	32	37	126	54	60
84.	2646	8	13	12	15	48	19	29	88	34	41
85.	2647	12	9	15	15	51	25	26	126	45	64
86.	2664	18	16	20	20	74	32	42	133	60	80
87.	2712	6	13	17	14	48	19	29	91	53	56
88.	2726	15	14	17	14	60	22	38	97	54	53
89.	2777	7	11	11	11	40	10	30	67	29	46
90.	2800	4	9	10	13	36	19	17	124	49	59
91.	2844	8	10	15	12	45	22	23	91	49	48
92.	2864	3	9	7	7	26	8	18	44	21	28
93.	2874	15	7	14	10	46	28	18	85	46	39
94.	2890	15	17	15	16	63	26	37	105	55	48
95.	2906	9	10	16	13	48	19	29	119	53	45
96.	2909	11	16	20	19	66	28	38	111	57	57
97.	2918	13	17	22	20	72	31	41	145	56	74
98.	2956	8	11	10	10	39	15	24	69	40	31
99.	2973	8	12	14	13	47	17	30	88	41	39
100.	3009	17	14	14	18	63	29	34	120	28	58
101.	3079	10	10	15	17	52	21	31	96	45	43
102.	3101	11	12	16	18	57	26	31	105	45	60
103.	3146	9	11	11	14	45	22	23	94	44	50
104.	3200	18	14	21	17	70	30	40	122	51	70
105.	3203	12	11	12	7	42	19	23	41	58	62
106.	3239	12	15	17	14	58	29	29	95	45	55
107.	3244	14	12	15	21	62	31	31	106	53	58
108.	3259	7	10	11	8	36	16	20	63	39	45
109.	3264	11	13	13	16	53	26	27	104	46	52
110.	3282	19	18	20	19	76	31	45	124	51	78
111.	3204	7	11	15	15	48	22	26	113	41	53
112.	3328	7	9	9	11	36	20	16	91	28	41
113.	3356	8	11	4	7	30	19	11	68	25	35
114.	3372	8	13	16	15	52	28	24	117	37	43
115.	3429	7	11	14	10	42	21	21	103	45	49
116.	3434	8	13	12	11	44	18	26	64	20	45
117.	3443	4	5	5	11	25	14	11	76	16	47
118.	3446	8	8	12	10	38	19	19	80	40	42
119.	3454	6	8	14	16	44	24	20	116	47	47
120.	3465	8	9	12	13	42	23	19	82	45	51
121.	3535	9	10	11	10	40	15	25	73	30	58
122.	3614	6	14	17	17	54	21	33	124	35	41
123.	3685	14	16	17	18	65	32	33	128	58	65
124.	3711	12	13	13	15	53	23	30	94	43	35
125.	3773	17	11	22	20	70	32	38	120	51	55

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
126.	3779	11	15	16	11	53	24	29	85	44	44
127.	3797	8	17	14	8	47	19	28	81	39	43
128.	3853	16	15	21	19	71	31	40	115	54	63
129.	3860	14	17	19	10	60	24	36	129	62	59
130.	3863	11	19	21	12	63	30	33	134	52	62
131.	3880	8	16	19	19	62	27	35	123	53	39
132.	3958	10	15	18	18	61	24	37	98	49	65
133.	3966	7	7	10	9	33	15	18	72	23	23
134.	3967	9	11	8	10	38	19	19	77	39	35
135.	3977	10	16	17	15	58	28	30	125	54	54
136.	4014	9	8	11	11	39	18	21	71	35	44
137.	4032	6	10	12	15	43	18	25	101	54	45
138.	4141	9	8	15	10	42	17	25	87	37	47
139.	4197	10	11	6	12	39	16	23	66	32	41
140.	4226	10	15	14	15	54	23	31	86	42	56
141.	4243	11	9	12	11	43	22	21	87	52	38
142.	4340	9	15	15	17	56	23	33	108	57	51
143.	4352	6	10	11	9	36	20	16	102	35	43
144.	4399	13	7	19	13	52	17	35	89	51	49
145.	4400	10	9	11	10	40	20	20	54	34	43
146.	4405	14	17	15	17	63	27	36	122	45	54
147.	4431	3	11	12	12	38	17	21	82	36	53
148.	4470	9	11	17	14	51	21	30	66	35	47
149.	4514	10	15	17	14	56	31	25	127	39	54
150.	4529	13	15	17	14	59	30	29	99	59	55
151.	4571	9	9	12	7	37	17	20	87	44	57
152.	4592	4	10	6	7	27	13	14	87	31	55
153.	4608	7	7	8	5	27	12	15	65	28	35
154.	4658	13	14	8	12	47	19	28	65	38	46
155.	4692	12	10	13	15	50	24	26	105	52	48
156.	4702	9	9	13	9	40	18	22	79	44	47
157.	4703	8	5	12	11	36	18	18	107	60	41
158.	4000	7	14	14	14	49	22	27	56	36	52
159.	4732	12	15	20	18	65	28	37	131	56	62
160.	4745	15	18	19	18	70	28	42	111	59	63
161.	4751	15	19	19	15	68	29	39	131	56	71
162.	4766	7	8	15	9	39	17	22	89	40	52
163.	4770	17	14	17	17	65	27	38	85	49	67
164.	4775	6	13	8	5	32	16	16	84	48	36
165.	4822	3	7	11	10	31	12	19	74	37	43
166.	4823	7	7	9	3	26	12	14	67	25	26
167.	4837	6	9	8	11	34	17	17	73	30	38
168.	4859	8	12	14	11	45	24	21	81	28	50
169.	4886	11	13	16	21	61	28	33	103	52	57
170.	4893	11	11	19	12	53	25	28	95	37	51
171.	4900	4	9	7	10	30	17	13	89	27	41
172.	4924	6	8	14	6	34	14	20	79	33	45
173.	4985	7	11	11	13	42	18	24	92	36	45
174.	5008	15	13	16	14	58	30	28	127	63	59
175.	5108	5	14	15	14	48	22	26	89	30	47

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
176.	5122	13	8	11	11	43	19	24	83	41	50
177.	5123	2	6	6	11	25	12	13	63	26	33
178.	5126	6	11	14	13	44	21	23	91	42	43
179.	5139	7	12	14	16	49	19	30	97	41	44
180.	5172	10	10	12	13	45	21	24	88	33	45
181.	5210	5	17	12	12	46	19	27	74	34	48
182.	5217	11	13	12	14	50	24	26	97	44	47
183.	5236	14	16	17	19	66	23	43	111	47	52
184.	5246	4	8	7	10	29	13	16	80	37	48
185.	5330	11	15	10	15	51	19	32	80	36	53
186.	5367	11	15	15	13	54	19	35	127	54	57
187.	5397	8	12	8	9	37	17	20	79	28	39
188.	5518	12	10	16	14	52	27	35	116	50	56
189.	5531	19	19	20	23	81	37	44	141	65	72
190.	5549	7	11	14	9	41	16	25	75	34	56
191.	5574	13	9	17	14	53	26	27	87	41	55
192.	5604	10	10	14	7	41	15	26	107	35	56
193.	5633	8	12	16	12	48	21	27	89	46	45
194.	5650	13	14	15	14	56	25	31	105	55	54
195.	5673	6	9	13	10	38	13	25	71	45	43
196.	5708	6	10	14	9	39	18	21	99	33	49
197.	5736	20	17	21	19	77	35	42	137	57	52
198.	5744	10	12	13	15	50	26	24	111	35	46
199.	5746	6	7	13	7	33	16	17	126	35	43
200.	5774	7	6	8	7	30	9	21	50	28	39
201.	5816	8	13	17	17	55	25	30	120	51	51
202.	5825	10	11	16	18	55	22	33	102	36	52
203.	5869	15	13	17	18	63	28	35	102	49	57
204.	5873	10	6	11	3	30	9	21	51	14	36
205.	5886	2	9	11	9	31	19	12	98	37	35
206.	5896	8	11	16	10	45	22	23	111	47	42
207.	5903	7	9	8	11	35	23	12	98	40	44
208.	5970	8	15	16	17	56	22	34	108	36	49
209.	5994	7	11	13	16	47	22	25	103	40	49
210.	6000	14	16	22	19	71	33	38	105	58	59
211.	6019	18	16	16	16	66	29	37	119	50	66
212.	6036	9	8	14	13	44	22	22	116	45	46
213.	6077	5	12	12	8	37	20	17	73	29	33
214.	6096	4	7	6	6	23	13	10	75	30	43
215.	6098	11	12	16	11	50	25	25	113	45	62
216.	6103	16	12	18	15	61	30	31	142	65	62
217.	6188	8	11	15	14	48	21	27	99	45	43
218.	6228	8	11	13	15	47	17	30	62	26	44
219.	6239	10	10	16	13	49	21	28	95	45	42
220.	6253	6	7	14	11	38	15	23	74	38	33
221.	6270	4	16	12	11	43	16	27	87	44	46
222.	6274	5	9	11	7	32	14	18	49	27	41
223.	6355	11	10	15	11	47	16	31	85	38	45
224.	6379	6	10	15	8	39	18	21	99	30	51
225.	6469	6	10	13	12	41	20	21	68	37	44

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
226.	6491	15	18	17	17	67	29	38	90	46	53
227.	6498	4	14	14	7	39	18	21	82	41	46
228.	6497	7	8	14	10	39	15	24	76	39	45
229.	6535	3	13	9	9	34	19	15	59	31	38
230.	6564	10	11	15	17	53	17	36	71	47	49
231.	6588	10	18	19	21	68	29	39	95	47	61
232.	6600	9	12	19	14	54	29	25	105	52	57
233.	6619	14	11	15	11	51	22	29	94	47	56
234.	6642	19	16	18	21	74	39	35	114	62	71
235.	6694	11	14	19	19	63	29	34	139	60	65
236.	6729	4	3	10	6	23	15	8	87	17	29
237.	6748	11	16	14	18	59	28	31	127	53	56
238.	6796	6	10	13	16	45	18	27	63	34	47
239.	6830	18	14	21	19	72	28	44	134	49	59
240.	6859	17	12	14	17	60	27	33	92	41	53
241.	6863	19	18	23	23	83	38	45	131	73	83
242.	6873	6	11	11	13	41	19	22	73	46	50
243.	6905	13	12	16	18	59	25	34	100	48	63
244.	6942	17	14	18	18	67	27	40	108	54	55
245.	6959	19	14	16	17	66	28	38	107	54	50
246.	6961	5	9	10	9	33	15	18	75	38	39
247.	6998	7	8	12	7	34	22	12	107	32	53
248.	7001	7	8	10	8	33	16	17	114	38	46
249.	7007	17	16	20	18	71	33	38	127	52	74
250.	7063	5	11	8	12	38	18	18	105	40	44
251.	7089	8	11	17	14	50	22	28	78	36	51
252.	7087	12	16	16	14	58	21	37	86	46	57
253.	7121	6	9	7	12	34	18	16	119	30	45
254.	7137	4	5	8	6	23	14	9	96	27	40
255.	7163	17	14	22	19	72	32	40	104	53	60
256.	7283	7	11	14	14	46	19	27	81	43	49
257.	7293	6	15	17	13	51	24	27	80	50	65
258.	7301	7	10	15	7	39	21	18	57	30	45
259.	7316	16	12	19	13	60	23	37	121	57	62
260.	7335	13	9	20	9	51	17	34	92	50	64
261.	7348	14	16	11	14	55	24	31	96	54	56
262.	7376	11	10	14	11	46	20	26	52	37	38
263.	7397	9	10	11	7	37	15	22	66	38	33
264.	7408	12	11	17	16	56	25	31	74	30	49
265.	7436	16	12	18	14	60	36	24	112	43	54
266.	7440	8	8	17	11	44	23	21	81	43	58
267.	7500	8	10	17	15	50	22	28	89	40	48
268.	7511	7	9	16	12	44	25	19	103	45	40
269.	7522	17	17	23	21	78	36	42	142	67	68
270.	7562	12	12	15	18	57	25	32	96	56	56
271.	7599	10	12	11	13	46	21	25	88	50	44
272.	7627	8	11	10	10	39	21	18	69	31	37
273.	7646	11	14	18	15	58	20	38	110	59	48
274.	7681	6	6	7	6	25	14	11	85	26	47
275.	7683	19	16	22	20	77	34	43	129	65	73

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
276.	7740	12	7	16	14	49	20	29	74	30	34
277.	7747	9	16	19	16	60	26	34	130	53	56
278.	7791	14	15	15	9	53	22	31	78	43	52
279.	7832	7	7	8	3	25	8	17	65	15	34
280.	7901	10	12	9	9	40	18	24	65	35	47
281.	7950	8	10	15	8	41	19	22	105	54	45
282.	8058	6	7	8	11	32	17	15	62	31	33
283.	8082	8	10	8	4	30	18	12	71	35	48
284.	8104	4	10	8	6	28	17	11	75	32	40
285.	8126	9	16	12	12	49	24	25	88	50	59
286.	8131	10	11	13	12	46	20	26	90	47	48
287.	8180	9	13	12	8	42	16	26	93	32	47
288.	8182	13	19	14	9	55	22	33	93	47	50
289.	8247	7	10	9	6	32	14	18	66	37	45
290.	8299	14	16	14	16	60	32	28	128	53	65
291.	8315	6	9	9	11	35	20	15	94	24	42
292.	8319	13	16	14	17	60	25	35	121	47	53
293.	8337	10	11	17	16	54	24	30	92	44	47
294.	8366	15	18	18	17	68	28	40	108	58	56
295.	8375	12	13	17	13	55	32	23	119	55	53
296.	8447	14	18	20	14	66	28	38	124	47	61
297.	8482	9	14	13	10	46	18	28	114	42	50
298.	8558	11	12	15	14	52	22	30	97	40	58
299.	8582	8	15	17	15	55	25	30	127	43	59
300.	8617	7	13	13	14	47	18	29	99	40	51
301.	8525	15	15	15	16	61	27	34	109	46	59
302.	8624	5	7	8	4	24	13	11	99	31	42
303.	8632	8	13	12	8	41	16	25	109	39	48
304.	8633	8	12	16	15	51	24	27	115	48	54
305.	8638	15	16	17	17	65	25	40	99	55	72
306.	8685	9	13	15	7	44	19	25	102	31	46
307.	8744	10	13	15	15	53	24	29	116	44	62
308.	8746	13	10	17	17	57	30	27	99	38	56
309.	8794	7	12	9	10	38	21	17	73	24	55
310.	8845	13	13	17	15	58	21	37	103	52	55
311.	8854	10	13	10	11	44	15	29	120	53	49
312.	8911	13	14	19	14	60	27	33	80	49	53
313.	8914	11	11	18	9	49	24	25	74	49	42
314.	8921	13	12	17	17	59	28	31	106	36	58
315.	8954	15	14	14	12	55	25	30	95	47	54
316.	8993	14	17	20	15	66	30	36	107	58	53
317.	8995	5	10	16	13	44	22	22	78	32	39
318.	9007	8	14	13	11	46	21	25	69	53	40
319.	9040	6	11	16	8	41	14	27	56	31	50
320.	9043	8	8	13	7	36	17	19	88	47	54
321.	9060	10	11	13	14	48	24	24	81	40	41
322.	9065	10	13	13	9	45	18	27	87	33	50
323.	9112	10	11	19	14	54	22	32	119	47	68
324.	9115	15	15	19	19	68	32	36	139	55	45
325.	9128	17	21	19	21	78	33	45	121	62	71

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
326.	9132	14	10	17	12	53	25	28	80	49	57
327.	9138	10	11	13	8	42	16	26	57	30	49
328.	9178	11	8	9	0	28	13	15	59	23	44
329.	9191	9	14	14	13	50	21	29	89	39	51
330.	9230	10	16	16	17	59	20	39	98	55	65
331.	9275	9	12	15	16	52	20	32	84	37	50
332.	9411	6	8	12	11	37	17	20	71	30	42
333.	9448	14	16	16	13	59	29	30	114	44	56
334.	9482	16	11	15	20	62	33	29	80	59	50
335.	9579	12	13	15	10	50	20	30	87	36	47
336.	9618	4	7	10	9	30	17	13	97	28	37
337.	9620	5	13	9	11	38	15	23	64	32	48
338.	9646	6	8	11	9	34	16	18	62	39	47
339.	9672	1	3	8	6	18	14	4	73	25	36
340.	9676	8	10	14	15	47	22	25	85	33	52
341.	9729	13	13	16	13	55	26	29	99	51	54
342.	9737	19	16	21	20	76	35	41	138	62	72
343.	9778	5	9	11	9	34	15	19	98	40	40
344.	9782	10	11	8	12	41	19	22	86	24	39
345.	9887	4	11	11	10	36	22	14	111	37	35
346.	9893	19	14	18	18	69	31	38	107	62	64
347.	9899	5	6	6	4	21	13	8	35	17	20
348.	9900	7	6	10	10	33	16	17	58	16	40
349.	9954	12	15	13	11	51	19	32	81	52	66
350.	9959	9	11	19	17	56	23	33	115	44	57
351.	9969	9	10	14	12	45	22	23	91	30	43
352.	9971	11	17	15	16	59	28	31	94	33	48
353.	9990	14	10	15	12	51	24	27	87	41	55
354.	10107	15	16	22	15	68	28	40	133	69	55
355.	6782	5	12	11	13	41	21	20	96	43	49

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TABLE XIV

RAW SCORES ON THE ALBERTA READING TEST AND STANDARD SCORES ON THE IOWA TESTS OF EDUCATIONAL DEVELOPMENT

	Random No. Candidate's No.	Part I, Reading	Part II, Reading	Part III, Reading	Part IV, Reading	Total, Reading	Total, Vocabulary	Test 4, Iowa	Test 5, Iowa	Test 6, Iowa	Test 7, Iowa	Test 8, Iowa	Total, Test 4-8, Iowa
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	1568	13	14	17	18	62	26		17	16	15	19	
2.	1569	14	14	20	19	67	27		23	19	17	18	
3.	1570	16	14	20	12	62	30		18	23	25	21	
4.	1571	14	16	16	18	64	29		17	16	16	19	
5.	1572	9	6	15	13	43	24		8	13	14	12	
6.	1573	12	12	15	20	59	26		15	15	14	15	
7.	1575	7	9	15	11	42	17		12	16	10	12	
8.	1576	21	12	21	20	74	33		22	22	24	25	
9.	1577	15	13	13	16	57	26		18	18	14	16	
10.	1578	10	11	10	9	40	20		12	14	14	13	
11.	1579	8	10	14	17	49	24		10	13	8	13	
12.	1580	19	17	20	21	77	33		21	18	16	16	
13.	1581	16	14	19	20	69	31		22	24	20	21	
14.	1582	14	8	12	16	50	22		17	16	15	14	
15.	1584	17	12	16	17	62	27		14	14	21	20	
16.	1585	11	9	15	13	48	21		12	15	11	15	
17.	1586	22	14	21	19	76	33		27	24	25	26	
18.	1587	11	8	14	16	49	27		10	12	10	15	
19.	1588	9	8	15	11	43	15		11	12	9	7	
20.	1589	11	13	14	10	48	20		14	15	16	16	
21.	1590	10	17	14	18	59	28		18	17	18	17	
22.	1591	10	15	15	15	55	24		15	18	15	14	
23.	1592	15	13	18	14	60	27		17	17	19	20	
24.	1593	11	16	15	12	54	23		10	14	16	14	
25.	1594	9	13	13	16	51	27		13	14	13	17	
26.	1595	9	9	12	11	41	19		14	11	13	13	
27.	6762	9	7	19	16	51	19	12	15	12	18	12	69
28.	6763	14	13	21	17	65	30	15	19	12	18	18	82
29.	6764	11	12	13	10	46	20	14	12	13	12	12	63
30.	6765	14	9	13	12	48	19	11	17	8	13	16	65
31.	6766	8	12	12	15	47	23	15	8	7	9	14	53
32.	6767	17	15	14	20	66	31	14	16	16	17	17	80
33.	6768	6	11	8	9	34	13	8	11	11	10	6	46
34.	6769	6	13	14	11	44	22	10	10	11	12	13	56
35.	6770	6	9	12	13	40	24	15	13	9	15	11	63

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
36.	6771	9	16	17	12	54	23	14	10	13	13	16	66
37.	6772	11	15	17	16	59	27	19	13	15	13	16	76
38.	6773	9	13	11	12	45	23	13	15	13	14	11	66
39.	6774	8	14	13	11	46	21	13	12	8	8	13	54
40.	6775	15	18	22	19	74	32	19	19	19	18	18	93
41.	6776	7	9	6	10	32	17	8	8	9	10	13	48
42.	6777	9	11	14	8	42	21	10	5	2	8	1	26
43.	6778	10	9	13	9	41	20	5	8	8	10	7	38
44.	6779	16	17	22	18	73	32	21	22	22	17	19	101
45.	6780	10	9	10	11	40	17	13	10	6	5	7	41
46.	6781	14	15	16	18	63	27	13	16	11	12	16	68
47.	6782	5	12	11	13	41	21	17	12	10	6	2	47
48.	6783	8	14	16	15	53	23	20	14	15	17	12	78
49.	6784	9	10	10	10	39	13	8	8	11	8	10	45
50.	6785	15	13	20	13	61	28	16	20	21	17	13	87
51.	6786	12	14	17	18	61	26	24	14	18	18	14	88
52.	6787	3	14	7	10	34	14	9	14	8	12	1	44
53.	6788	6	14	14	13	47	19	20	16	17	18	14	85
54.	6789	15	12	14	15	56	26	17	15	18	17	15	82
55.	6790	13	14	15	12	54	23	16	17	17	18	13	81
56.	6791	11	12	14	11	48	19	19	5	13	8	9	54
57.	6792	6	9	10	9	34	15	8	5	9	10	10	42
58.	6793	14	12	17	11	54	24	15	18	16	15	15	79
59.	8504	20	19	17	22	78	36	22	25	23	26	26	122
60.	8505	7	8	9	13	37	18	10	6	6	10	11	43
61.	8506	11	13	18	16	58	28	8	11	14	12	18	63
62.	8507	10	14	17	15	56	22	10	13	13	16	12	64
63.	8508	22	18	21	22	83	38	20	23	26	22	26	117
64.	8509	17	14	18	17	66	33	17	19	15	21	23	95
65.	8510	14	18	17	21	70	28	18	13	13	11	15	70
66.	8511	8	13	17	15	53	21	10	12	11	14	10	57
67.	8512	7	10	9	9	35	19	10	10	14	7	11	52
68.	8513	10	13	16	17	56	24	18	19	13	14	15	79
69.	8514	15	14	20	17	66	31	17	12	14	17	16	76
70.	8516	8	10	10	13	41	19	10	12	9	14	11	56
71.	8517	20	18	21	18	77	35	18	21	19	22	22	102
72.	8518	14	17	20	18	69	29	14	18	17	20	15	84
73.	8519	13	15	17	12	57	27	10	10	13	14	13	60
74.	8520	10	5	13	15	43	20	1	10	6	11	15	43
75.	8521	3	10	11	12	36	17	10	12	12	15	16	65
76.	8522	12	15	19	15	61	24	13	15	14	16	15	73
77.	8523	7	11	9	11	38	19	7	6	5	6	6	30
78.	8524	11	9	12	10	42	18	10	13	17	15	11	66
79.	8525	15	15	15	16	61	27	17	13	15	14	17	76
80.	8526	16	15	17	14	62	25	15	14	15	19	18	81
81.	8527	6	10	16	16	48	24	10	9	9	13	13	54
82.	8528	5	12	9	6	32	17	9	5	3	6	1	24
83.	8529	9	14	18	18	59	22	12	17	15	18	20	82
84.	8531	13	11	16	16	56	29	14	13	14	17	16	74
85.	8532	9	12	9	10	40	20	14	11	6	8	6	45

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
86.	8533	7	11	8	8	34	17	10	9	9	9	8	45
87.	8534	10	8	12	8	38	19	10	7	8	4	11	40
88.	8535	9	14	15	13	51	22	14	7	14	14	15	64
89.	8537	13	12	16	18	59	23	17	17	15	19	11	79
90.	8538	12	11	13	19	55	26	18	13	15	15	20	81
91.	8540	14	14	19	17	64	30	17	17	19	18	21	92
92.	8541	5	12	11	12	40	21	16	6	6	5	5	38

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TABLE XV

Arithmetic Means and Standard Deviations for Scores on the Alberta Tests and the Henmon-Nelson Test. N = 355.

Test	Possible Score	Arithmetic Mean	Standard Deviation
Alberta Reading Test			
from ungrouped data	91	49.31	± 13.57
from grouped data	91	49.4	± 13.55
Alberta Literature Test			
from ungrouped data	77	43.28	± 11.35
from grouped data	77	43.2	± 11.50
Alberta Test in General Science and Health			
from ungrouped data	162	94.03	± 22.67
from grouped data	162	94.2	± 22.75
Alberta Reading Test (without Vocabulary Sections), grouped data	51	27.0	± 8.40
Vocabulary Sections of Alberta Reading Test			
from grouped data	40	22.3	± 6.22
Henmon-Nelson Test of Mental Ability			
from grouped data	90	50.7	± 10.35

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TABLE XVI

Arithmetic Means and Standard Deviations of Scores*on the Alberta Reading Test and Its Parts and on the Iowa Tests of Educational Development

Test	N	Arithmetic Mean	Standard Deviation
Alberta, Part I	92	11.32	± 4.17
Alberta, Part II	66	12.61	± 2.86
Alberta, Part III	92	14.85	± 3.73
Alberta, Part IV	92	14.33	± 3.69
Alberta, Vocabulary	92	23.90	± 5.41
Total, Alberta	66	51.71	± 12.60
Iowa, Test 4	66	13.59	± 4.24
Iowa, Test 5	92	13.72	± 4.70
Iowa, Test 6	92	13.71	± 4.76
Iowa, Test 7	92	14.20	± 4.72
Iowa, Test 8	92	14.14	± 5.23
Total, Iowa Tests 4-8	66	66.00	± 20.54

*Alberta scores are raw scores. Iowa scores are standard scores from SRA marking service. Data were ungrouped.

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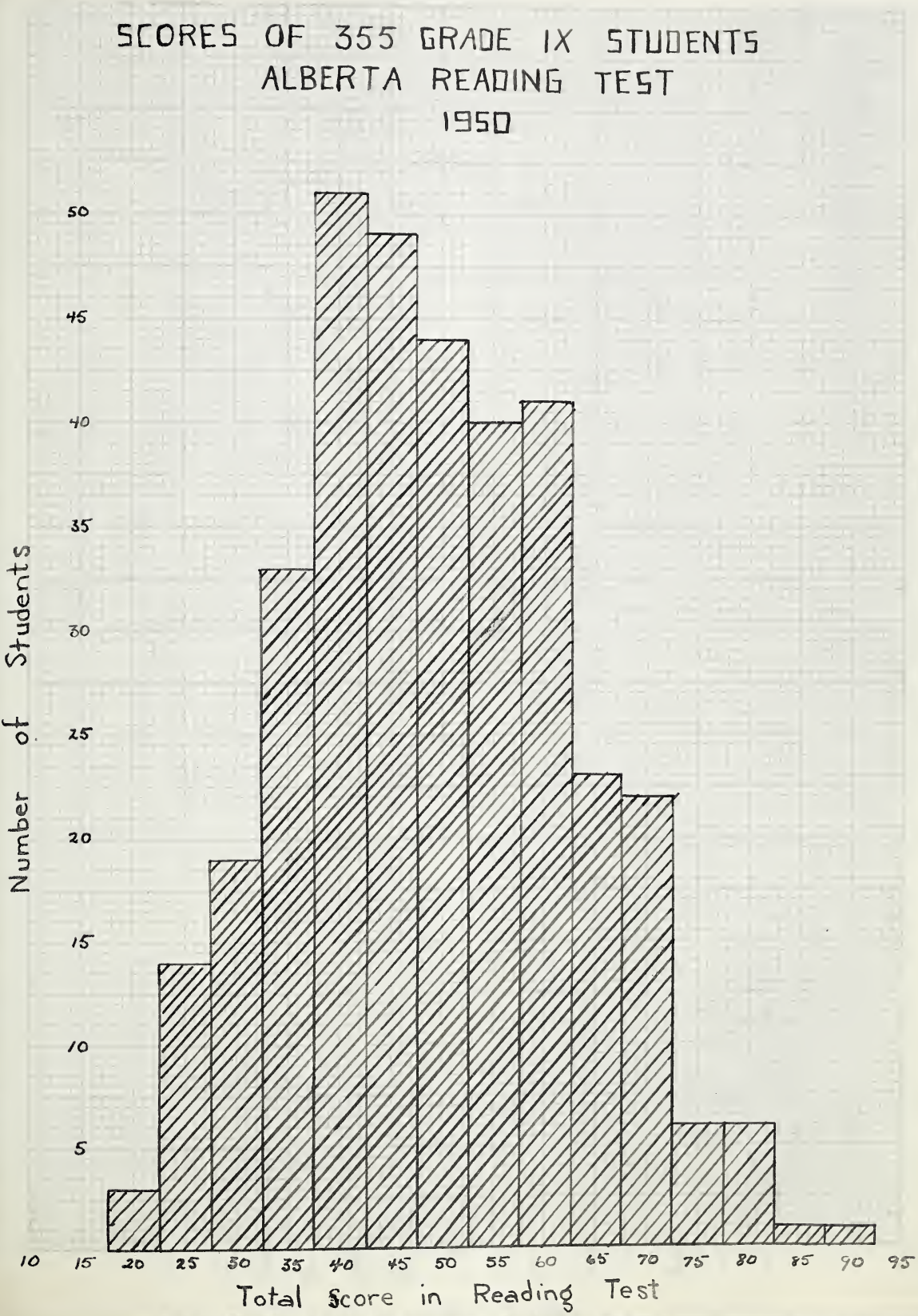
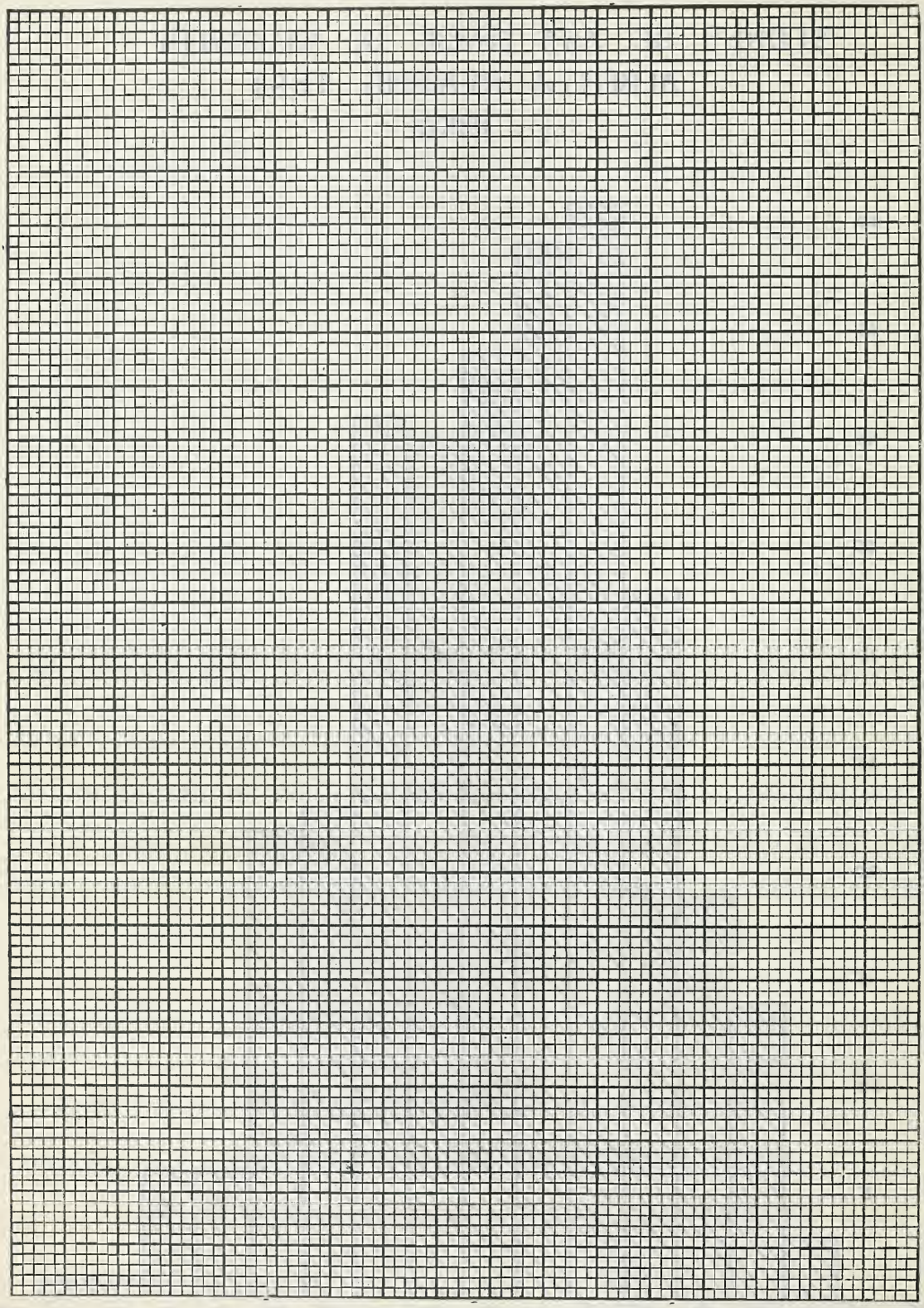


Fig. 1. Distribution of total reading



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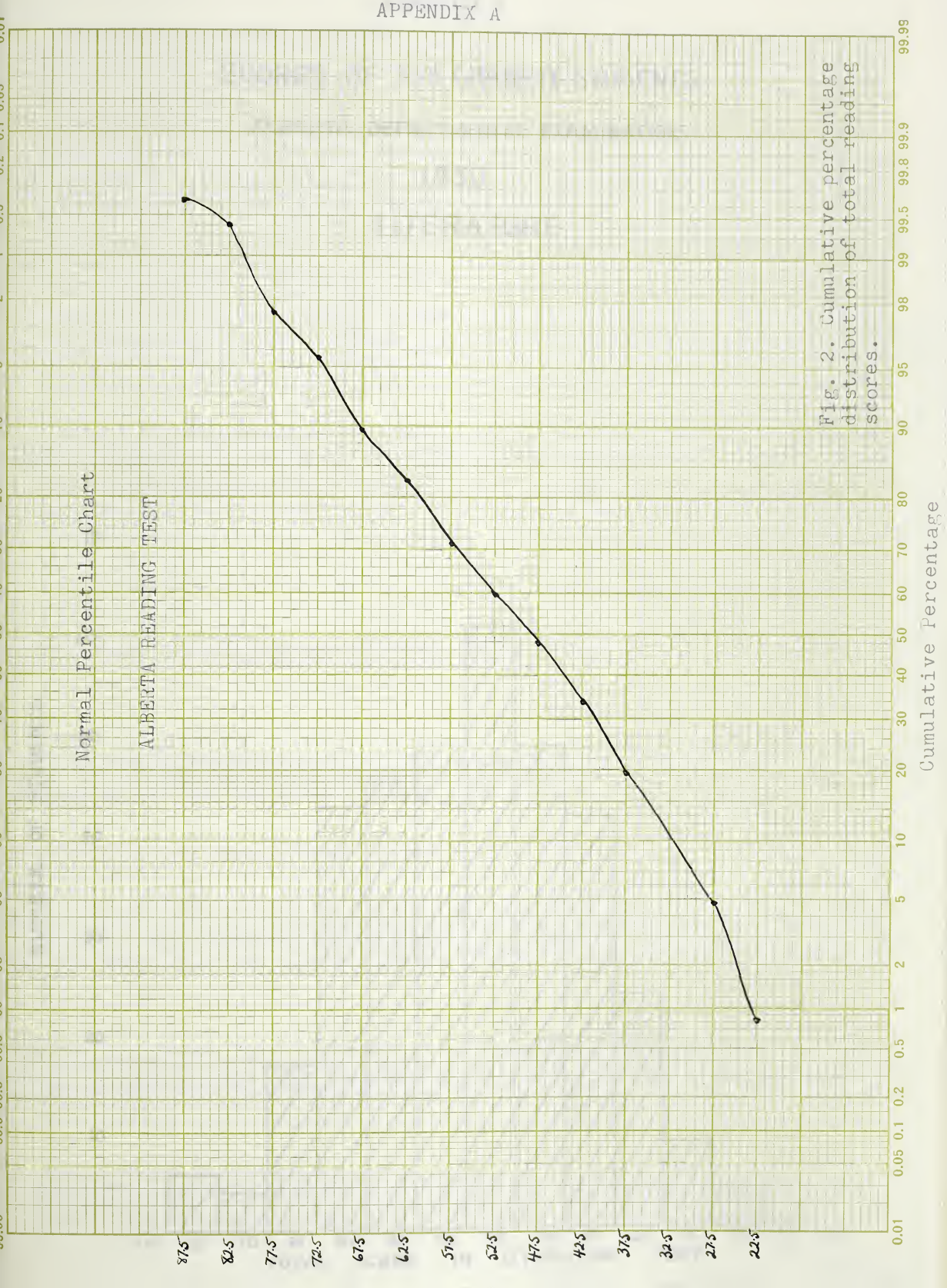
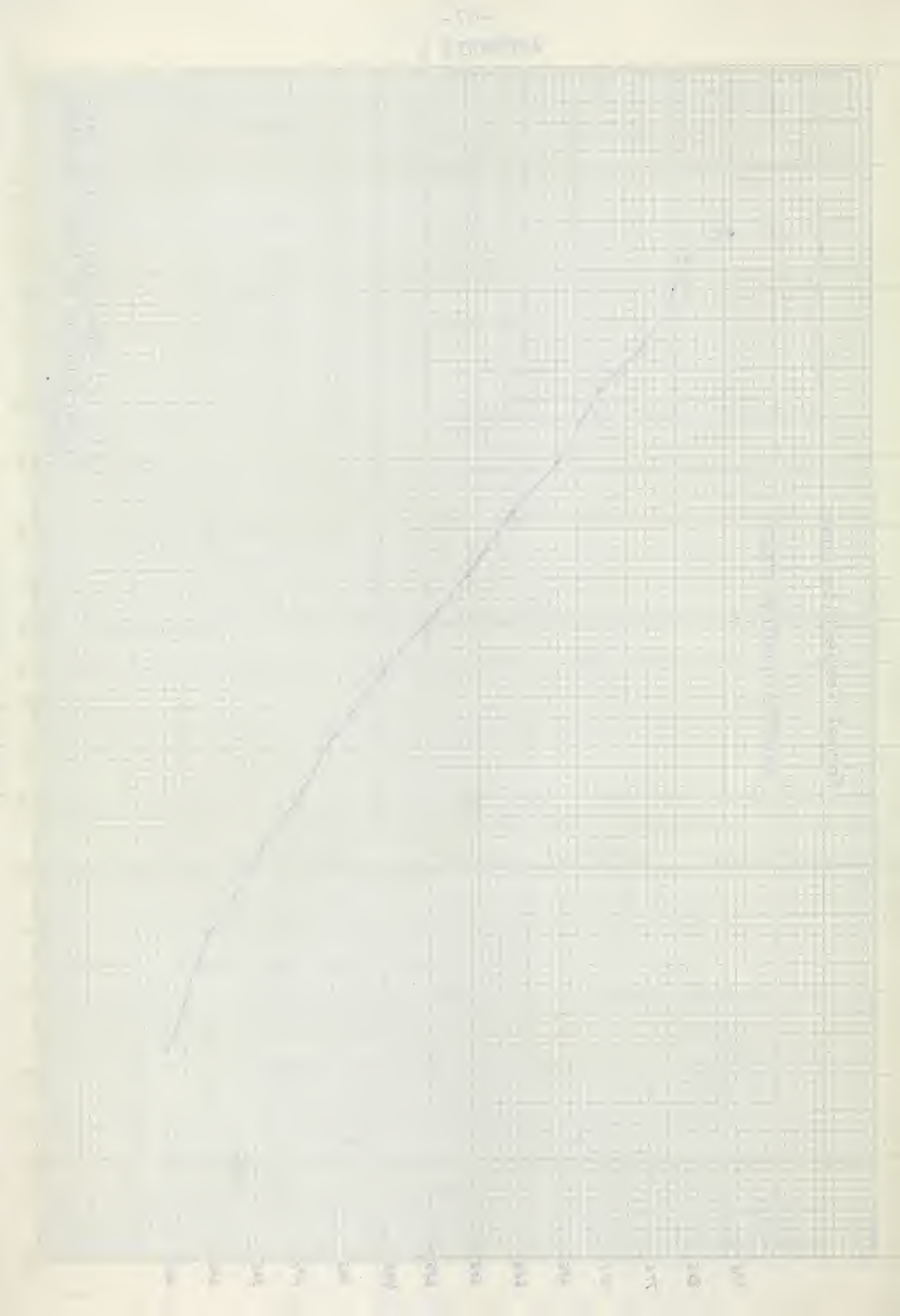


Fig. 2. Cumulative percentage distribution of total reading scores.



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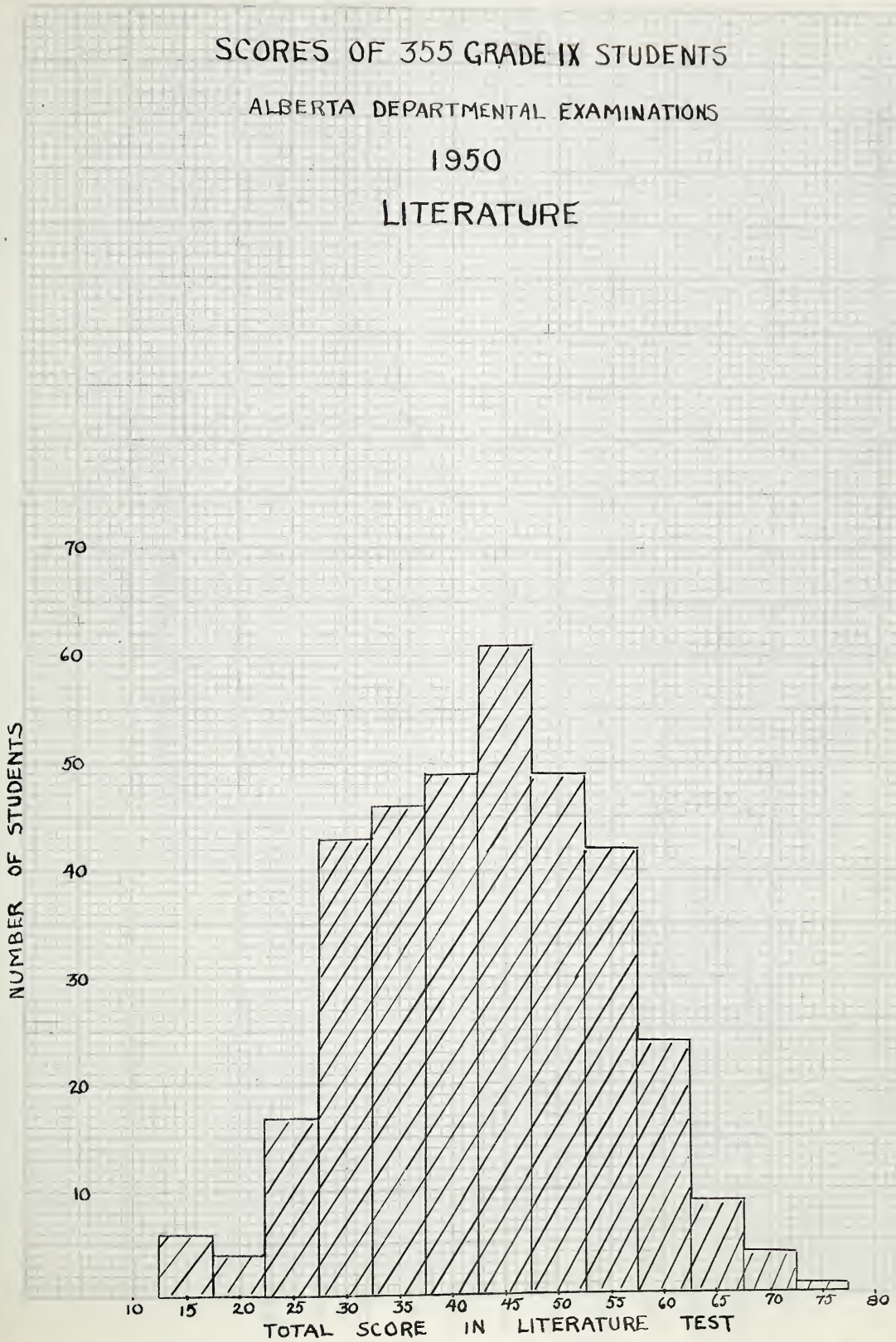


Fig. 3. Distribution of the scores in literature.

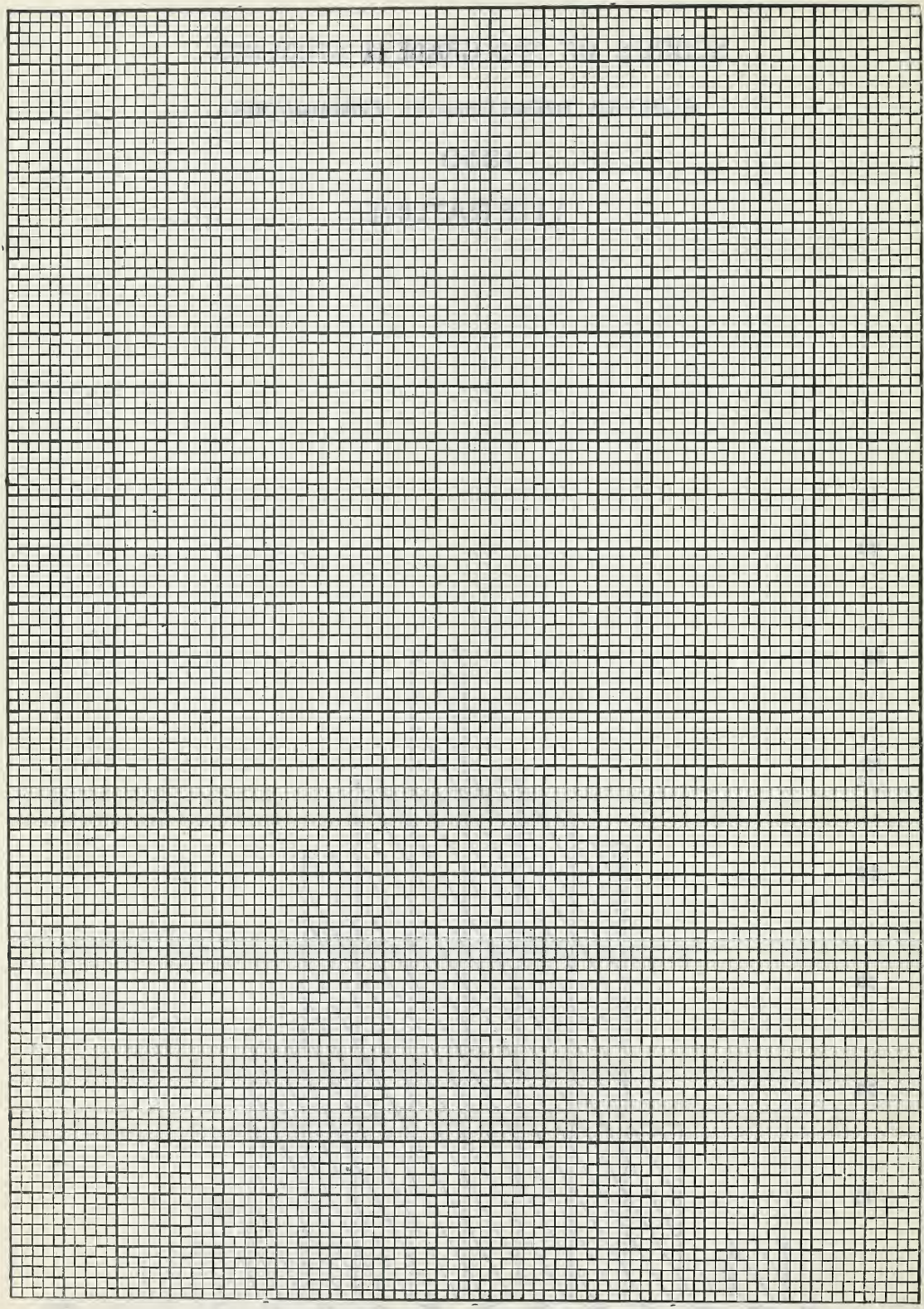
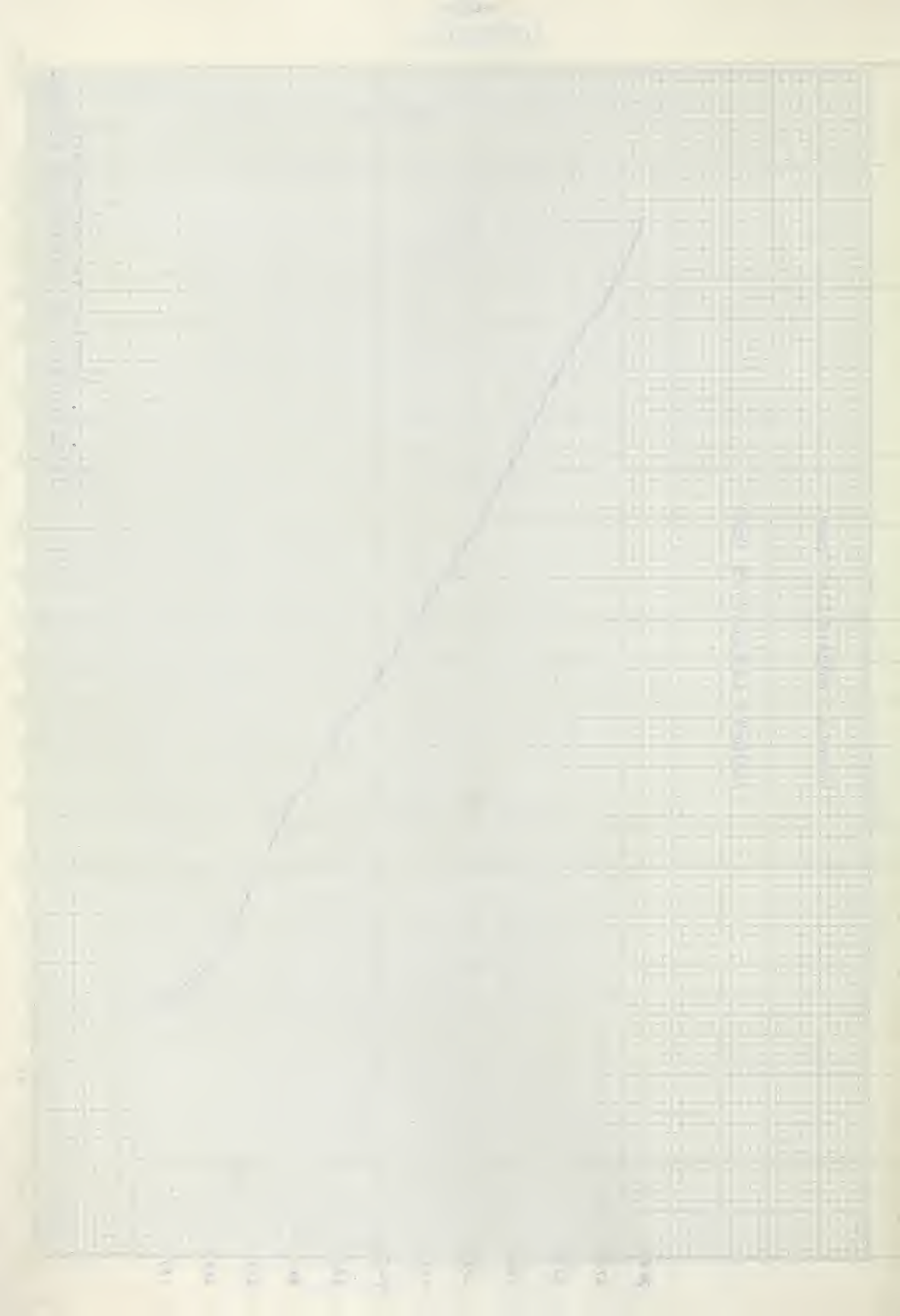


Fig. 4. Cumulative percentage distribution of literature scores.



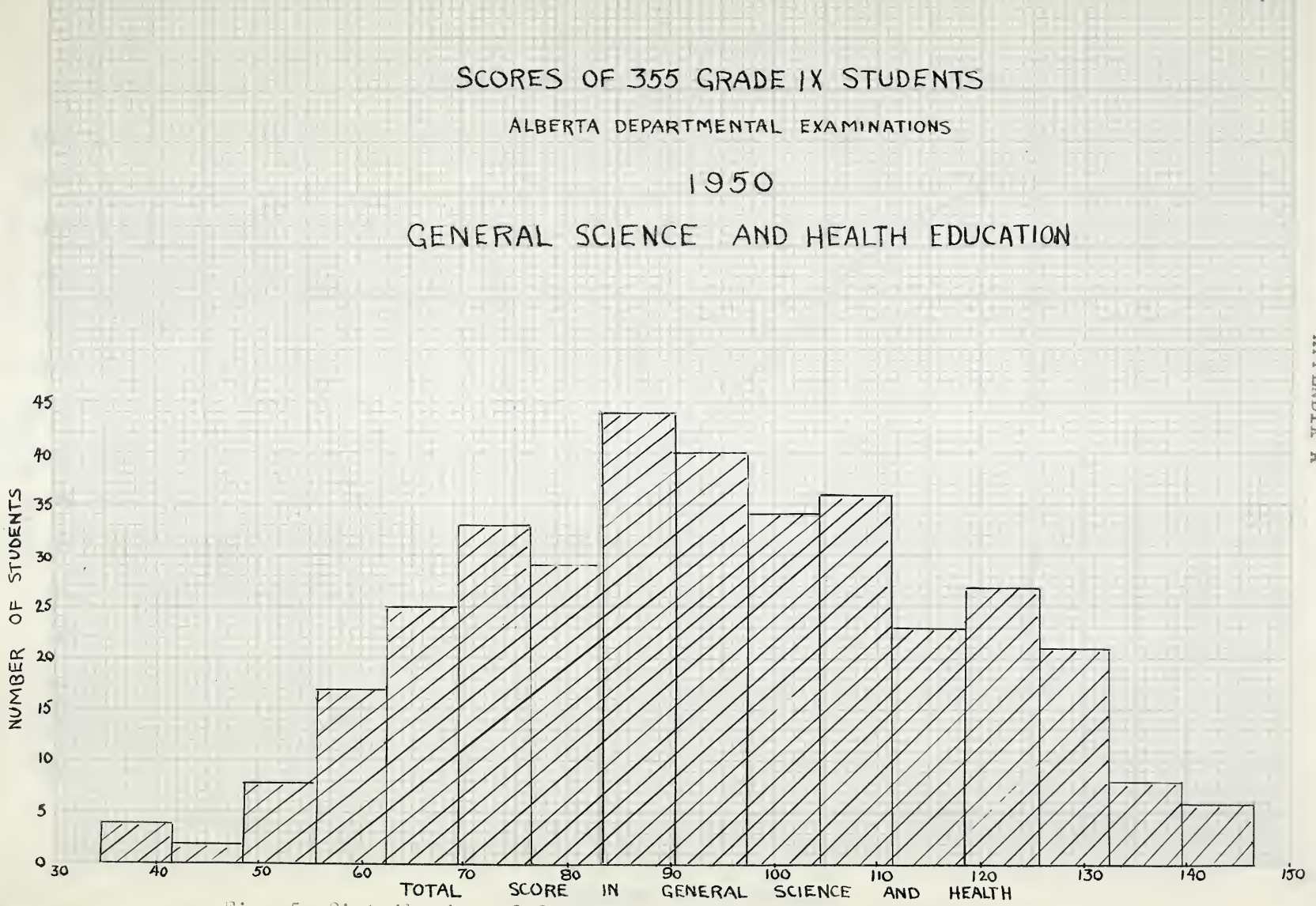
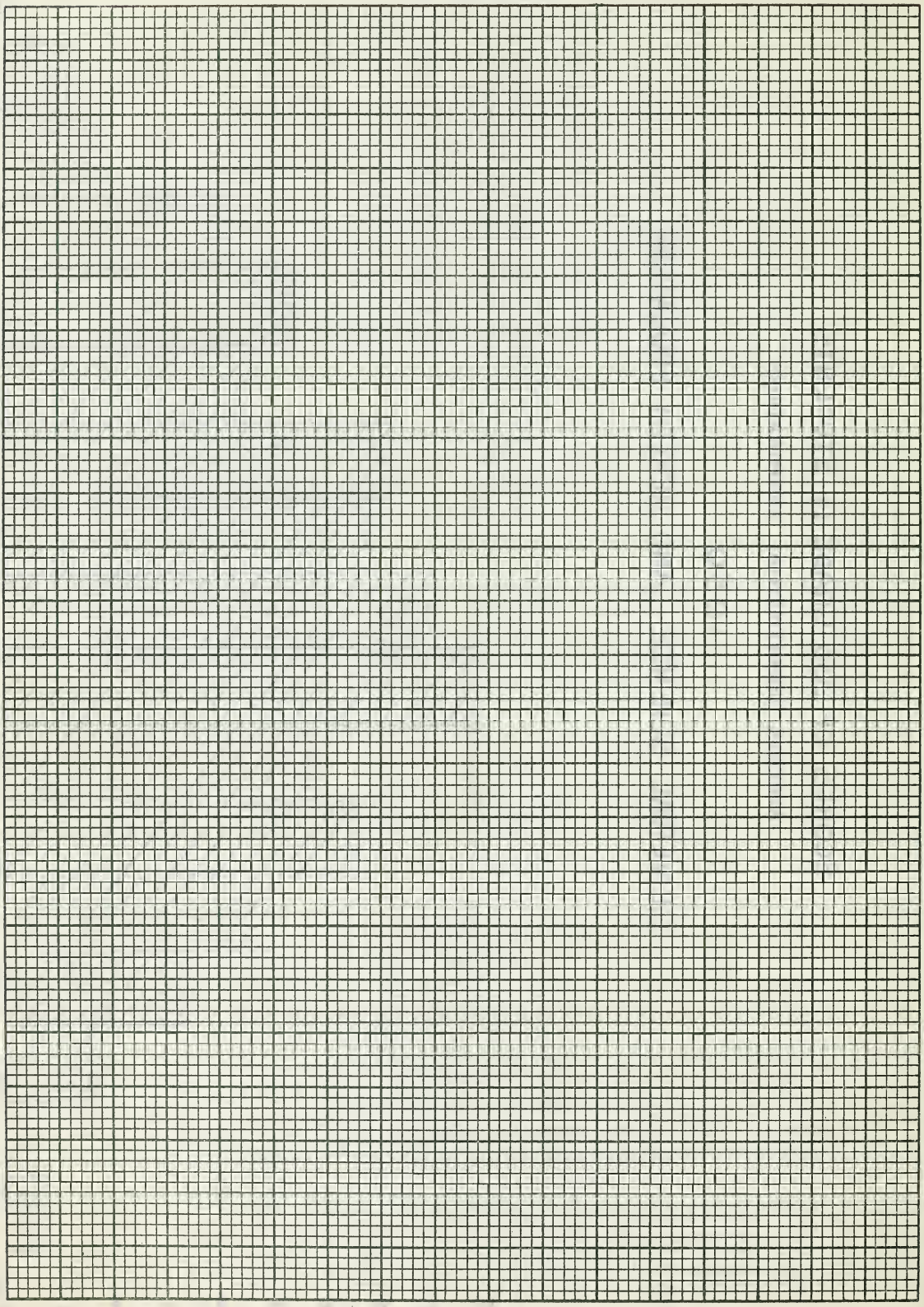


Fig. 5. Distribution of Scores in General Science and Health Education



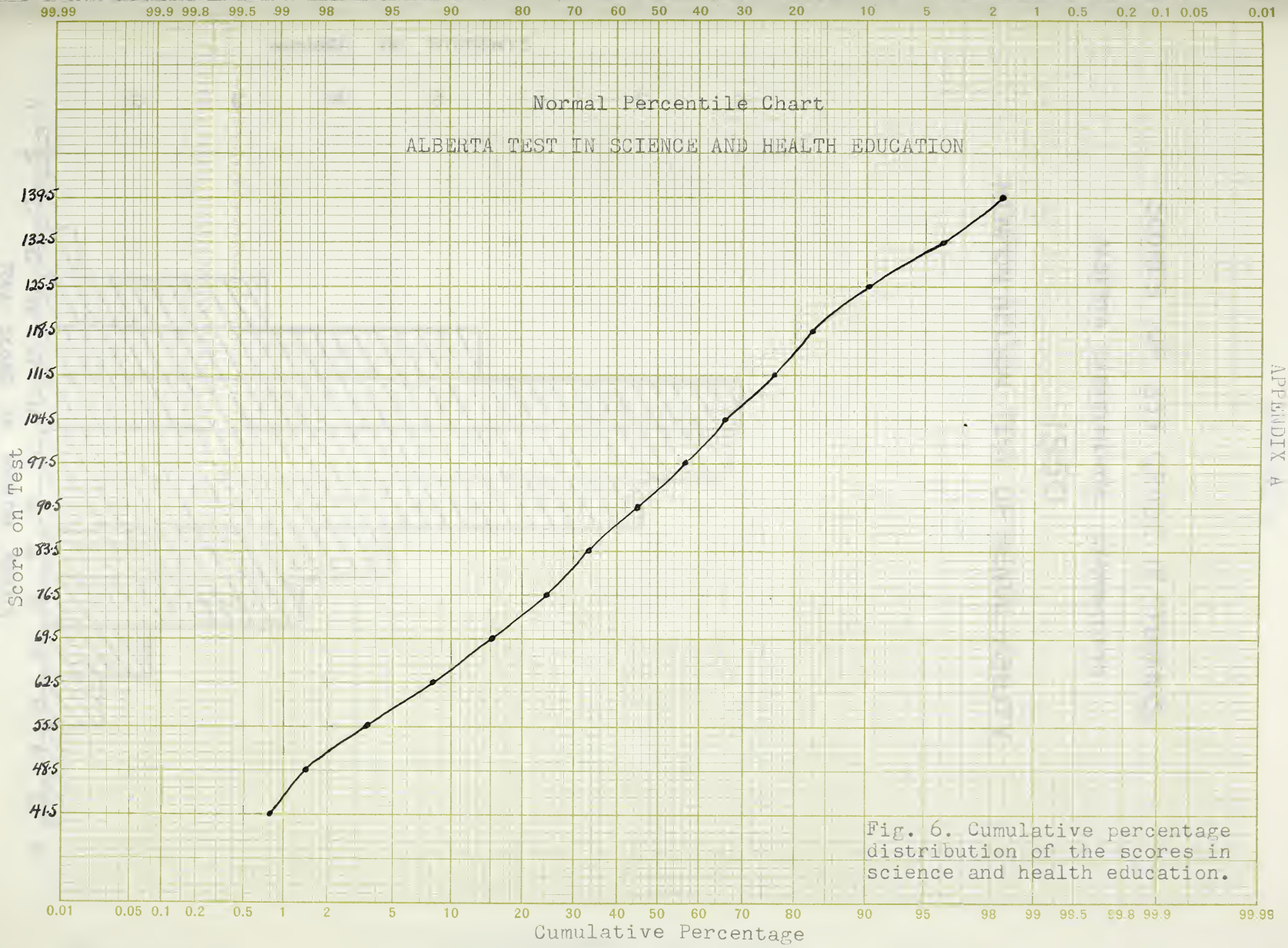
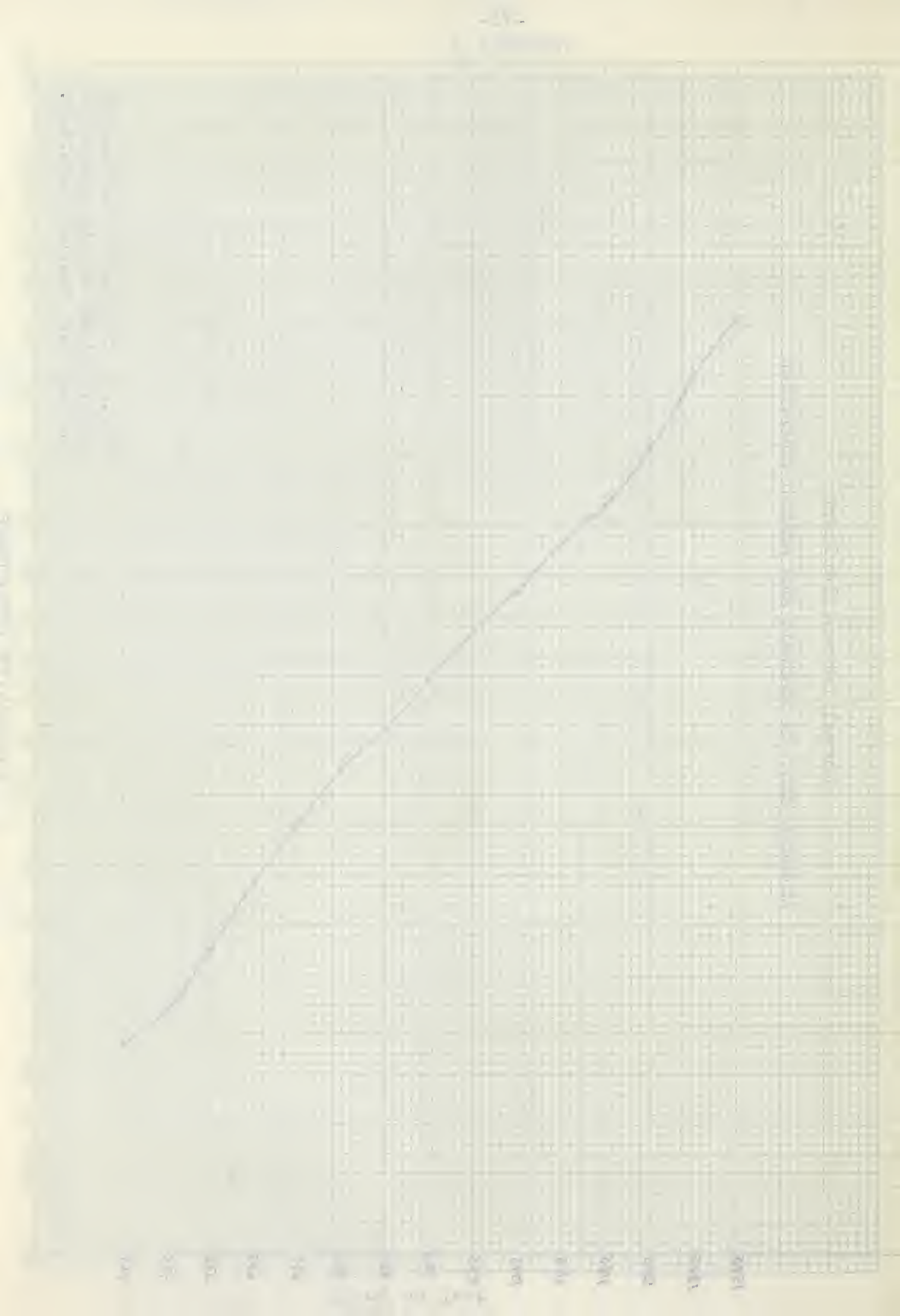


Fig. 6. Cumulative percentage distribution of the scores in science and health education.



APPENDIX A

SCORES OF 355 GRADE IX STUDENTS

ALBERTA DEPARTMENTAL EXAMINATIONS

1950

HENMON-NELSON TEST OF MENTAL ABILITY

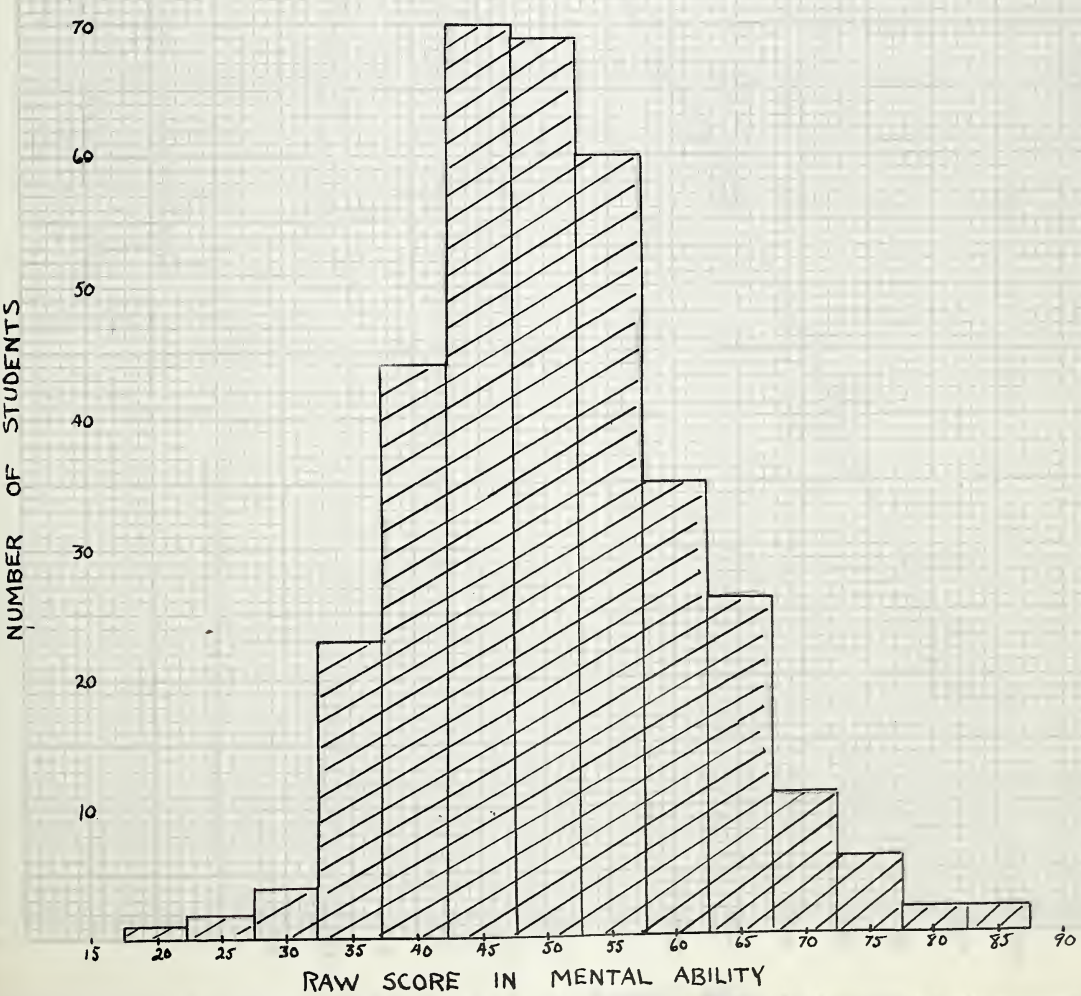
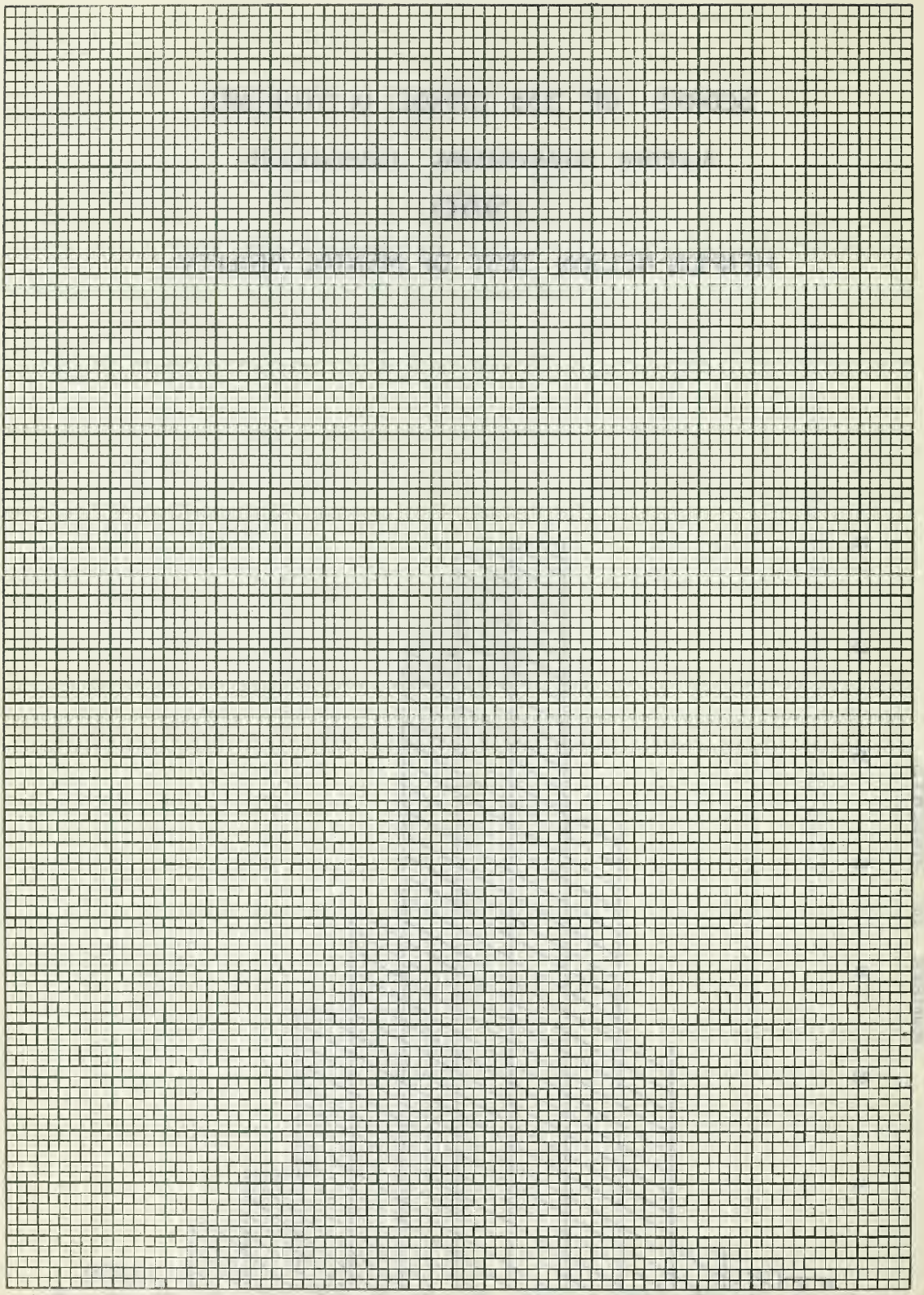


Fig. 7. Distribution of the mental ability scores



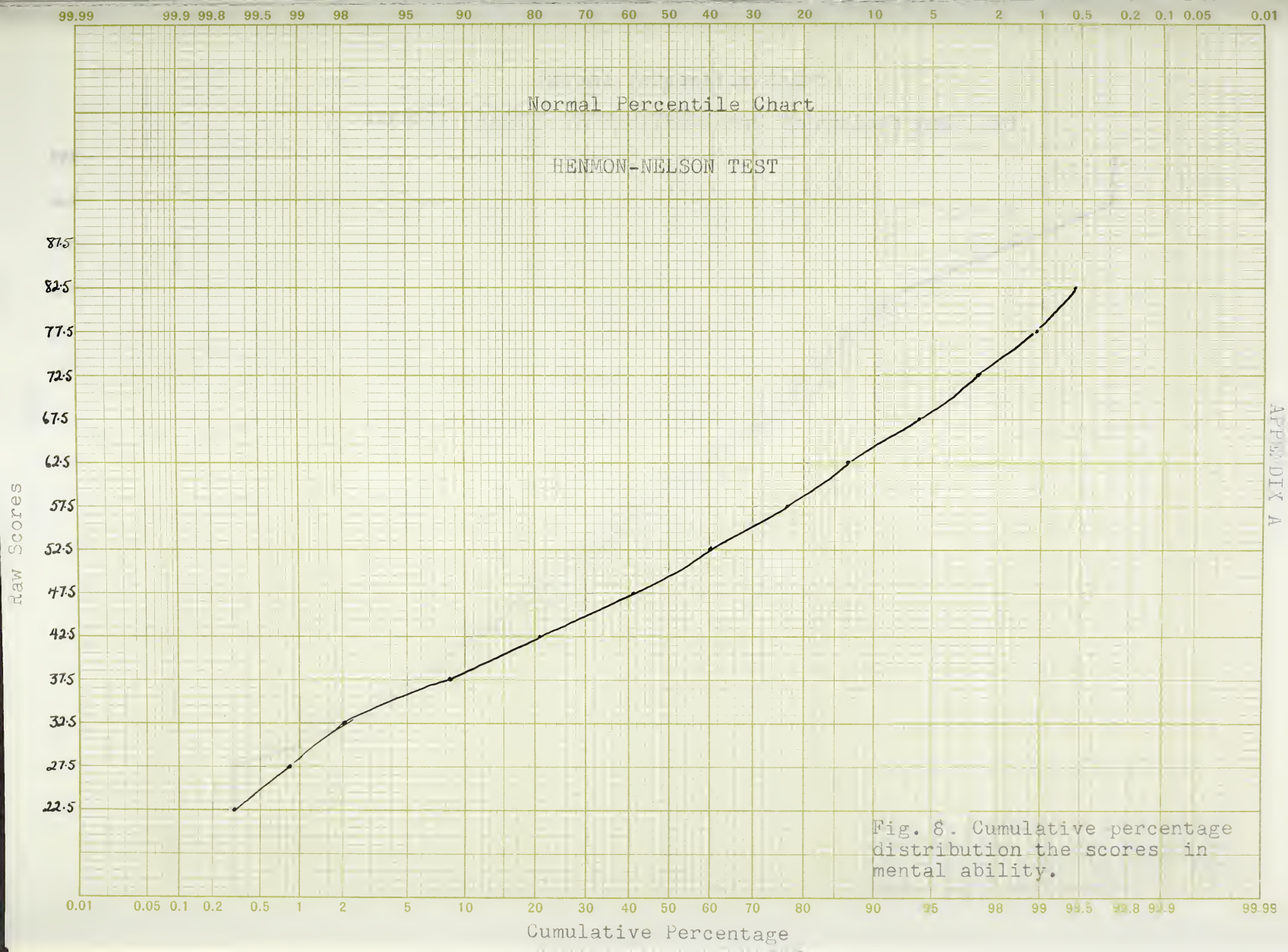
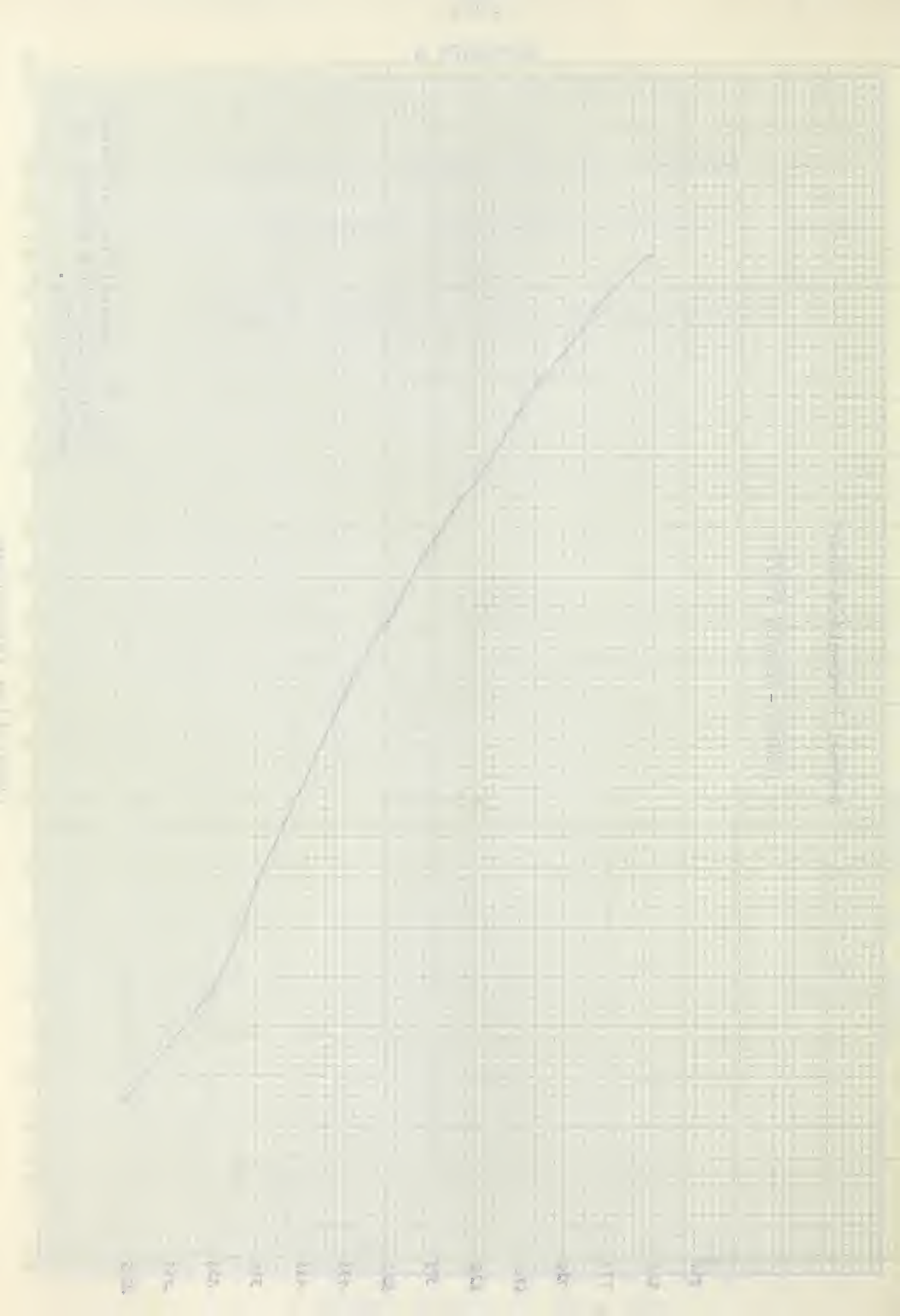


Fig. 8. Cumulative percentage distribution the scores in mental ability.



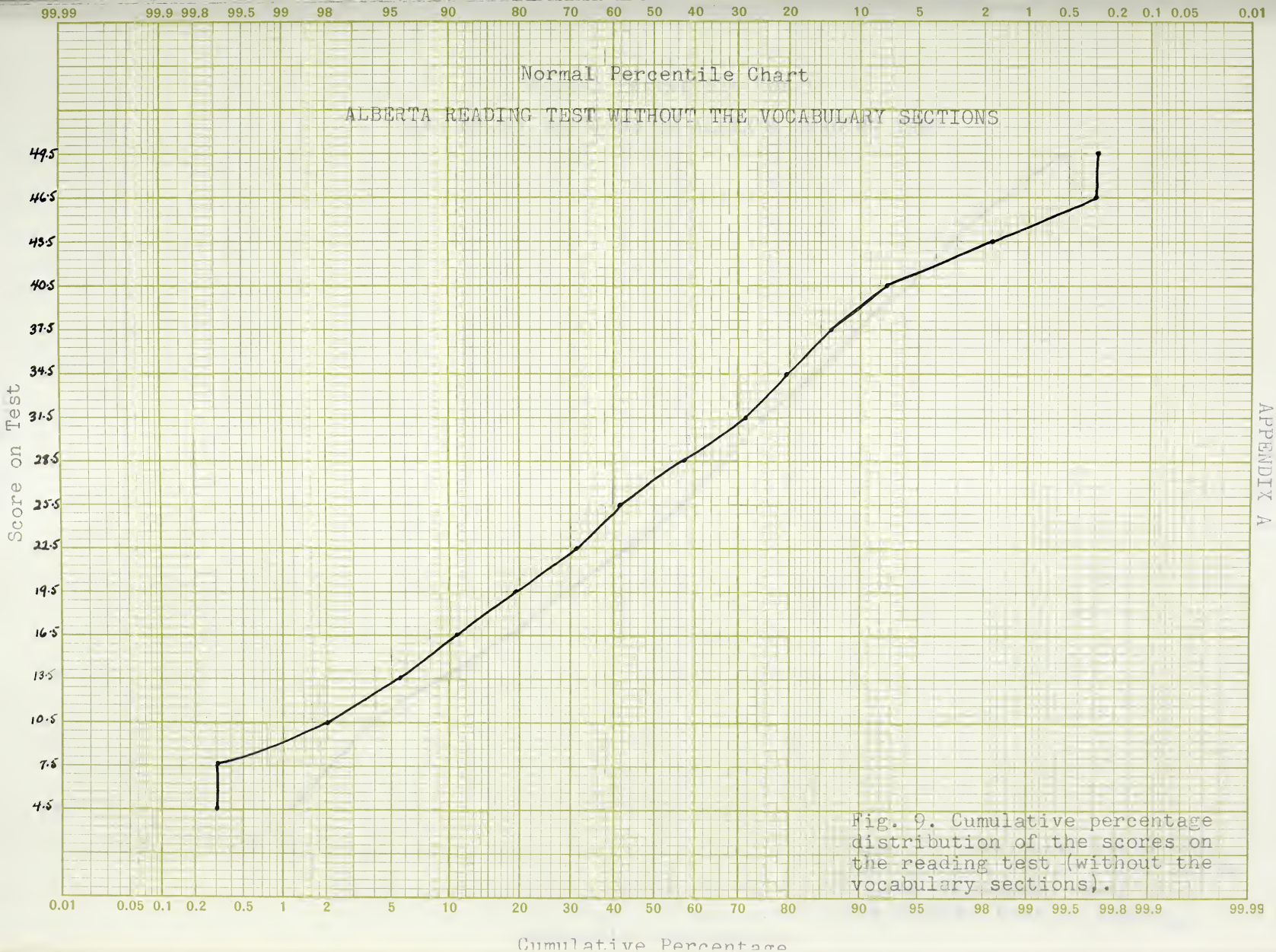
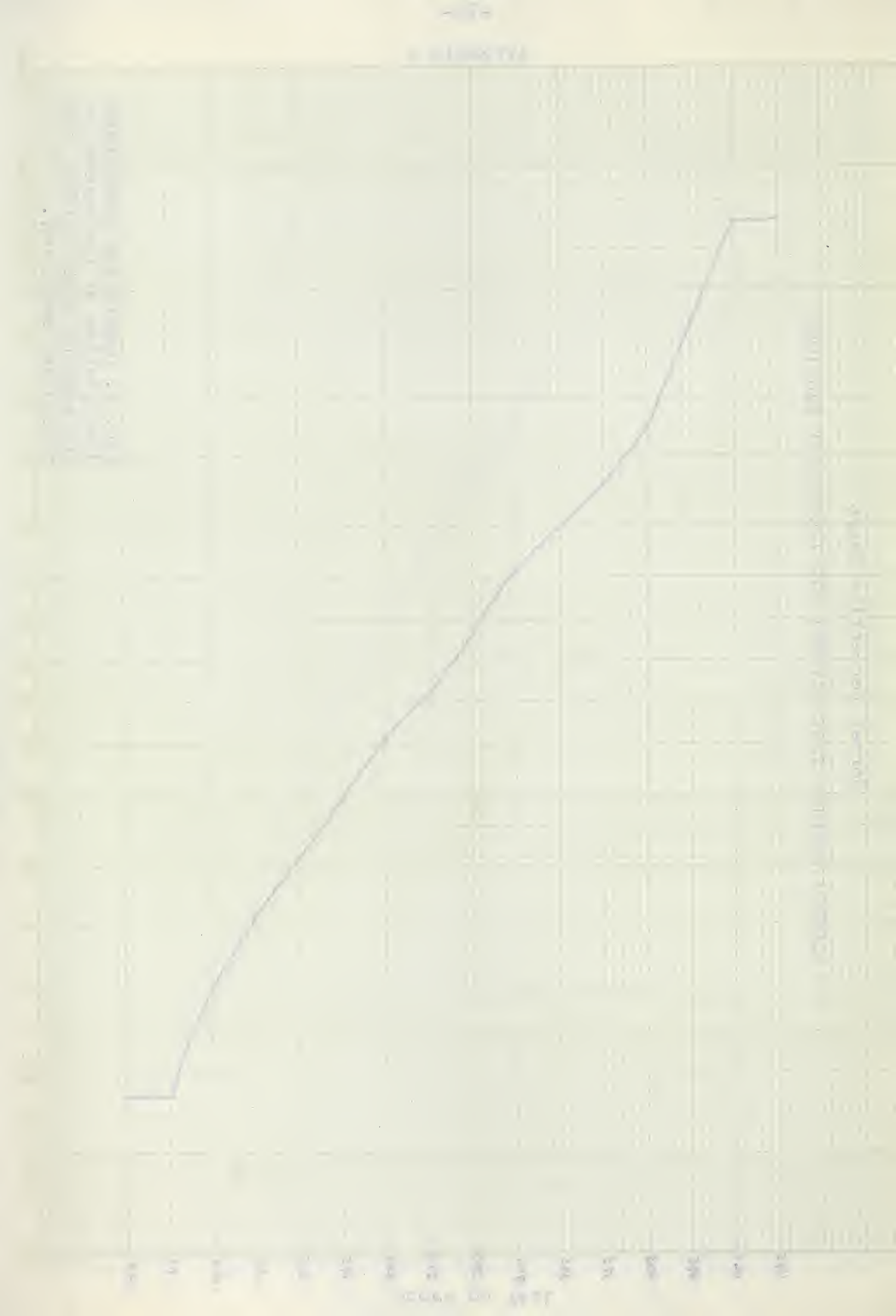


Fig. 9. Cumulative percentage distribution of the scores on the reading test (without the vocabulary sections).



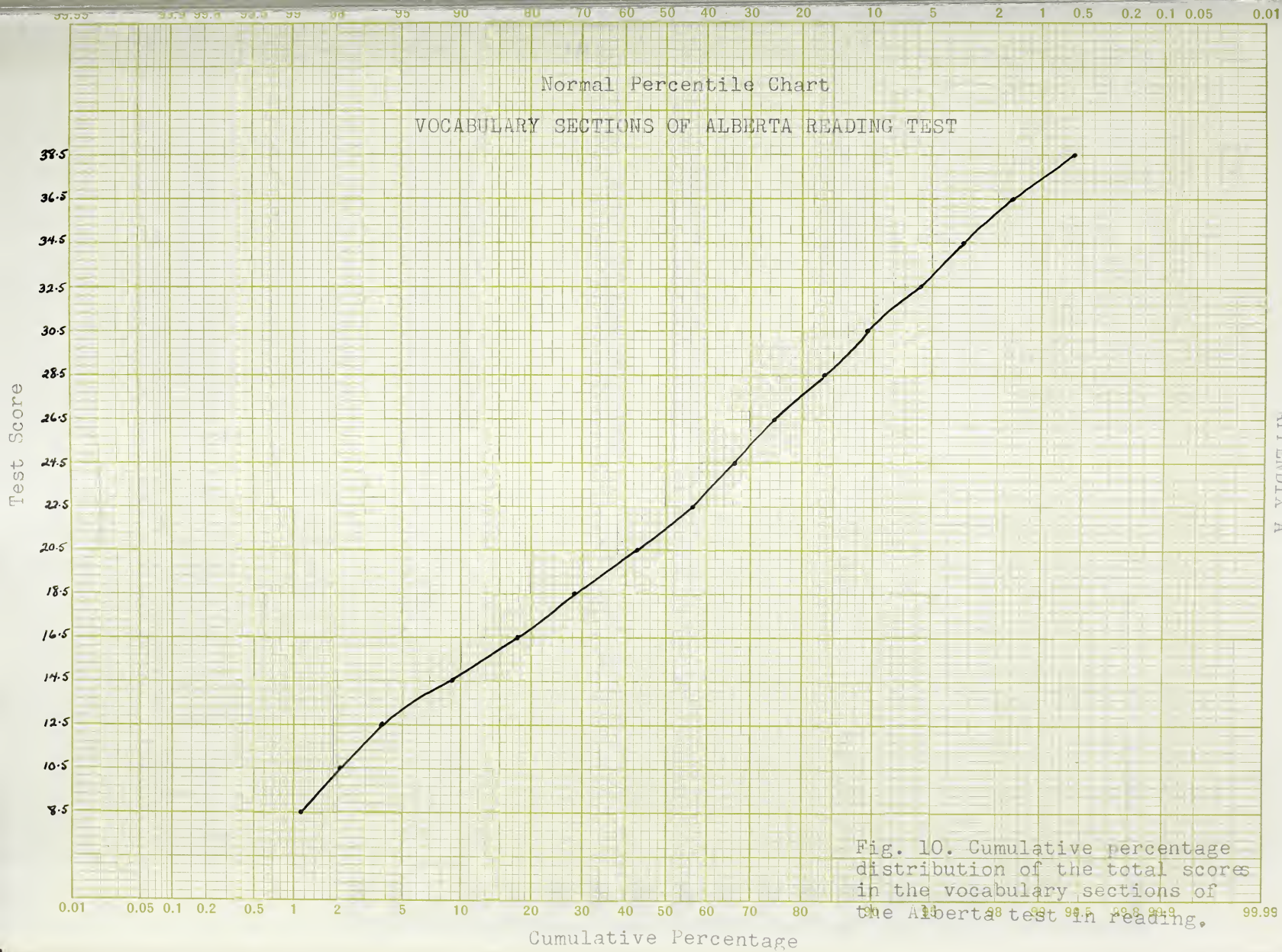
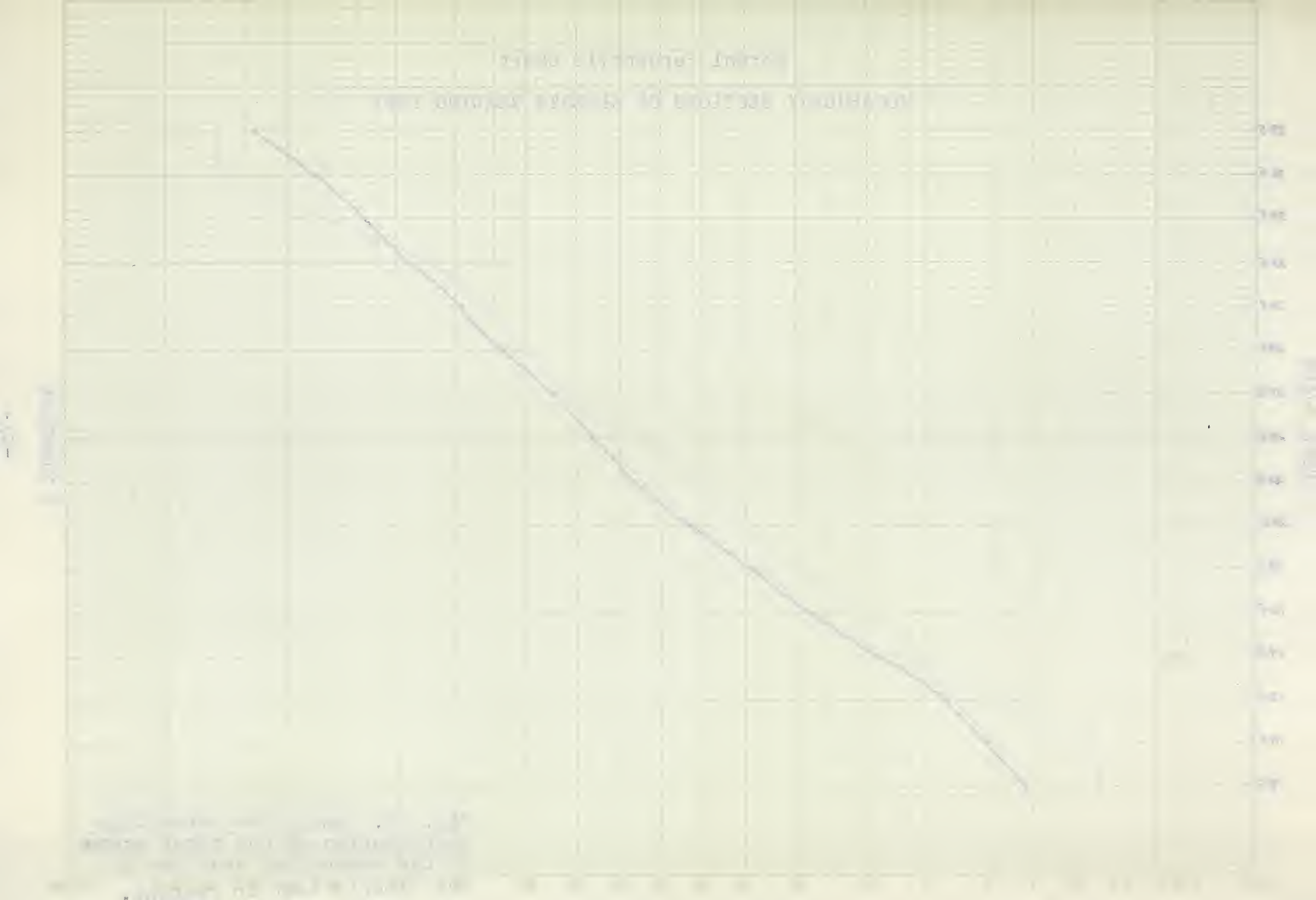


Fig. 10. Cumulative percentage distribution of the total scores in the vocabulary sections of the Alberta test in reading.



CORRELATION CHART FOR COMPUTATION OF PEARSON PRODUCT-MOMENT COEFFICIENT OF CORRELATION

X SCALE REPRESENTS TOTAL SCORES, VOCABULARY SECTIONS, ALBERTA READING TEST

			5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	31-32	33-34	35-36	37-38	39-40		f	d	y'	y'²	x'y' +	x'y' −
	-100	-90	-80	-70	-60	-50	-40	-30	-20	-10		10	20	30	40	50	60	70	80	90	100		10				
	-90	-81	-72	-63	-54	-45	-36	-27	-18	-9		9	18	27	36	45	54	63	72	81	90		9				
	-80	-72	-64	-56	-48	-40	-32	-24	-16	-8		8	16	24	32	40	48	56	64	72	80		8				
65-67	-70	-63	-56	-49	-42	-35	-28	-21	-14	-7		7	14	21	28	35	42	49	56 1	63 1	70	2	7	14	98	119	
62-64	-60	-54	-48	-42	-36	-30	-24	-18	-12	-6		6	12	18	24	30 2	36	42	48	54	60	2	6	12	72	60	
57-61	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5		5	10	15	20	25 1	30 3	35 1	40 1	45	50	6	5	30	150	190	
52-56	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4	1	4 4 1	8 8 1	12	16 2	20	24 1	28 2	32 2	36 1	40	11	4	44	176	224	
47-51	-30	-27	-24	-21	-18	-15	-12	-9	-6 1	-3 2	1	12 3 4	12 6 2	45 9 5	36 12 3	75 15 5	54 18 3	21	24	27	30	26	3	78	234	234	-12
42-46	-20	-18	-16	-14	-12	-10	-8	-6 1	-4 1	-2 2	1	14 2 7	16 4 4	30 6 5	56 8 7	50 10 5	12 12 1	14 14 1	16	18	20	35	2	70	140	192	-14
37-41	-10	-9	-8	-7	-6	-5	-4 -8 2	-3 -6 2	-2 -8 4	-1 -4 4	7	6 1 6	20 2 10	42 3 14	28 4 7	15 5 3	6	7 7 1	8	9	10	60	1	60	60	118	-26
32-36							3	4	12	12	15	8	7	5	1		1	1				69					
27-31	10	9	8	7 7 1	6 6 1	15 5 3	28 4 7	27 3 9	28 2 14	12 1 12	12	-6 -1 6	-4 -2 2	-3 -3 1	-4	-10 -5 2	-6	-7	-8	-9	-10	70	-1	-70	70	123	-23
22-26	20	18	16	14 14 1	12 12 1	10	24 8 3	42 6 7	28 4 7	16 2 8	8	-8 -2 4	-12 -4 3	-12 -6 2	-8	-10	-12	-14	-16	-18	-20	44	-2	-88	176	136	-32
17-21	30	27	24	21 21 1	18 18 1	30 15 2	36 12 3	36 9 4	12 6 2	18 3 6	3	-3 -3 1	-6	-9	-12	-15	-18	-21	-24	-27	-30	23	-3	-69	207	171	-3
12-16	40	36	32	28 28 1	24	20	16	24 12 2	8	4 4 1		-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	4	-4	-16	64	56	
7-11	50	45	40	35	30	25 25 1	20	15 15 1	10	5		-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	2	-5	-10	50	40	
2-6	60	54	48	42	36	30	24 24 1	18	12	6		-6	-12	-18	-24	-30	-36	-42	-48	-54	-60	1	-6	-6	36	24	
	70	63	56	49	42	35	28	21	14	7		-7	-14	-21	-28	-35	-42	-49	-56	-63	-70		-7				
	80	72	64	56	48	40	32	24	16	8		-8	-16	-24	-32	-40	-48	-56	-64	-72	-80		-8				
	90	81	72	63	54	45	36	27	18	9		-9	-18	-27	-36	-45	-54	-63	-72	-81	-90		-9				
	100	90	80	70	60	50	40	30	20	10		-10	-20	-30	-40	-50	-60	-70	-80	-90	-100		-10				
f				4	3	6	19	30	41	47	48	37	29	32	20	18	9	6	4	2							
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10						
x'				-28	-18	30	-76	-90	-82	-47		37	58	96	80	90	54	42	32	18							
x'²				196	108	150	304	270	164	47		37	116	288	320	450	324	294	256	162							

Σf (N)	Σy'	Σy'²
355	49	1533
Σx'		
136		
Σx'²		
3486		

Σ+x'y'	Σ−x'y'
1687	-110
Σx'y'	
1577	

$$\frac{\Sigma x'}{N} = \frac{136}{355} = .38$$

$$\left(\frac{\Sigma x'}{N}\right)^2 = (.38)^2 = .14$$

$$\frac{\Sigma x'^2}{N} = \frac{3486}{355} = 9.82$$

$$\frac{\Sigma y'}{N} = \frac{49}{355} = .14$$

$$\left(\frac{\Sigma y'}{N}\right)^2 = (.14)^2 = .02$$

$$\frac{\Sigma y'^2}{N} = \frac{1533}{355} = 4.32$$

$$\frac{\Sigma x'y'}{N} = \frac{1577}{355} = 4.44$$

$$\sigma_x = \sqrt{\frac{\Sigma x'^2}{N} - \left(\frac{\Sigma x'}{N}\right)^2} = \sqrt{9.82 - .14}$$

$$= 3.11$$

$$\sigma_y = \sqrt{\frac{\Sigma y'^2}{N} - \left(\frac{\Sigma y'}{N}\right)^2} = \sqrt{4.32 - .02}$$

$$= 2.07$$

$$r = \frac{\frac{\Sigma x'y'}{N} - \left(\frac{\Sigma x'}{N}\right)\left(\frac{\Sigma y'}{N}\right)}{\sigma_x \cdot \sigma_y}$$

$$= \frac{4.44 - (.38)(.14)}{(3.11)(2.07)} = \frac{4.44 - .05}{6.44}$$

$$= \frac{4.39}{6.44} = .68$$

$$\sigma_r = \frac{1 - r^2}{\sqrt{N-1}} = \frac{1 - (.68)^2}{\sqrt{354}} = \frac{1 - .46}{18.82}$$

$$= \frac{0.54}{18.82} = .029$$

Fig. 11. Example of a correlation chart.

APPENDIX A

TABLE XVII

Bivariate Distribution of the Mental-Ability Scores and the Total Reading Scores for 355 Grade IX Students

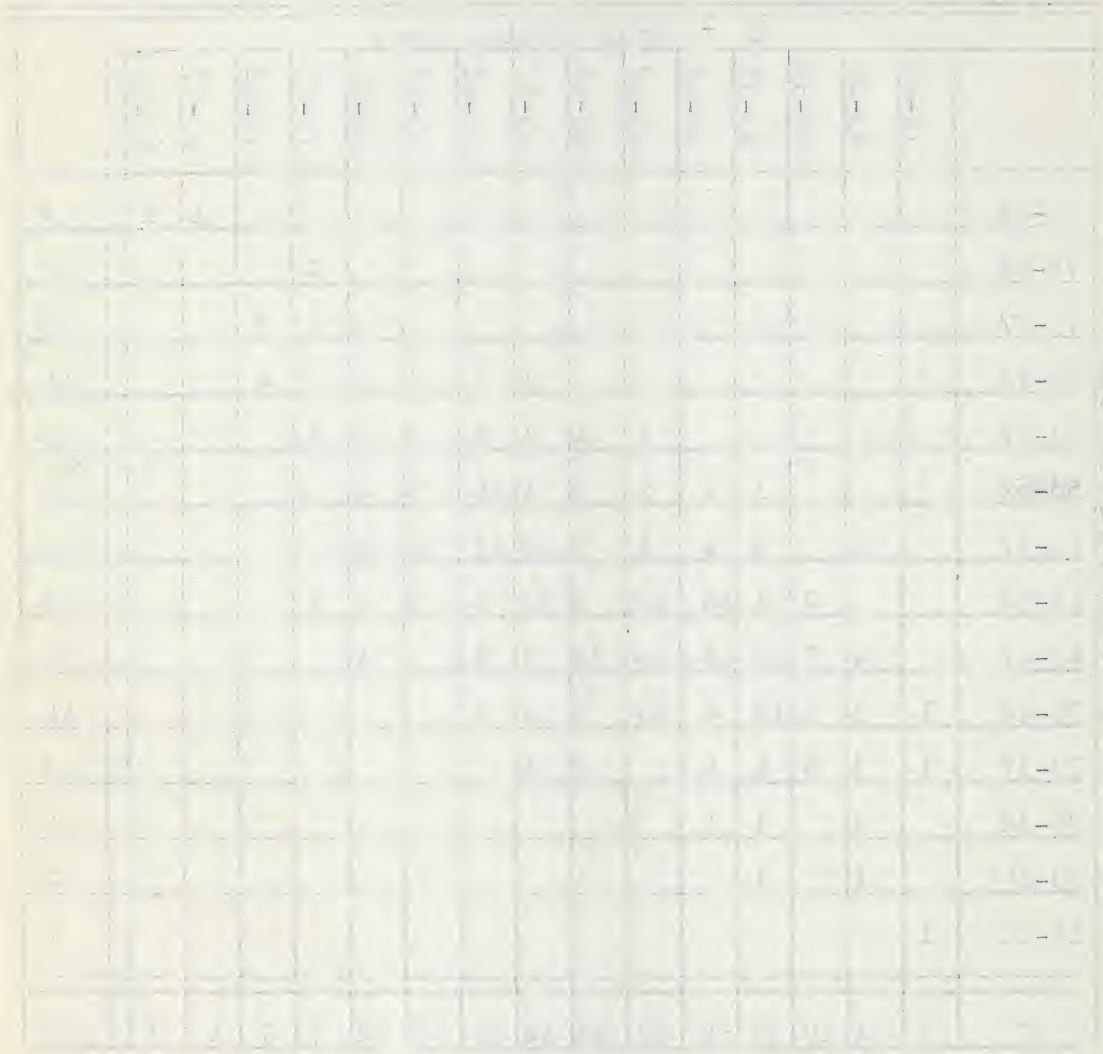
Y = Henmon-Nelson Score \ X = Total Reading Score	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	68-72	73-77	78-82	83-87	88-92	f
83-87														1	1	2
78-82												2				2
73-77											2	1	3			6
68-72								1	1	1	2	2	4			11
63-67						1	4	1	6	8	5	1				26
58-62				1	2	2	3	4	10	5	8					35
53-57		1		5	4	1	9	16	15	6	3					60
48-52			2	1	16	19	8	12	6	3	1	1				69
43-47		4	5	10	18	16	12	3	1		1					70
38-42	1	3	4	10	6	10	6	2	2							44
33-37	1	3	8	4	4		2	1								23
28-32		2		1	1											4
23-27		1		1												2
18-22	1															1
f	3	14	19	33	51	49	44	40	41	23	22	7	7	1	1	355

$\bar{X} = 50 + 5(-.12) = 49.4$ $\quad r = .76$

$\bar{Y} = 50 + 5(.14) = 50.7$ $\quad \sigma_r = \pm .022$

$\sigma_x = \pm 5(2.71) = \pm 13.55$

$\sigma_y = \pm 5(2.07) = \pm 10.35$



APPENDIX A

TABLE XVIII

Bivariate Distribution of Mental-Ability and Literature Scores for 355 Grade IX Students

Y = Henmon-Nelson Score \ X = Literature Score	13-17	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58-62	63-67	68-72	73-77	f
83-87												1	1	2
78-82								1		1				2
73-77								1	1		2	2		6
68-72							1	1	3	3	3			11
63-67						2	1	10	4	8	1			26
58-62				2	2	2	8	6	8	5	2			35
53-57			1	3	4	9	13	12	14	3		1		60
48-52				7	16	11	15	10	6	3	1			69
43-47	1	3	4	10	18	14	14	2	4					70
38-42	1		5	13	4	6	7	5	2	1				44
33-37	2		4	8	2	4	2	1						23
28-32	1	1	1			1								4
23-27			2											2
18-22	1													1
f	6	4	17	43	46	49	61	49	42	24	9	4	1	355

$\bar{X} = 45 + 5(-.36) = 43.2$

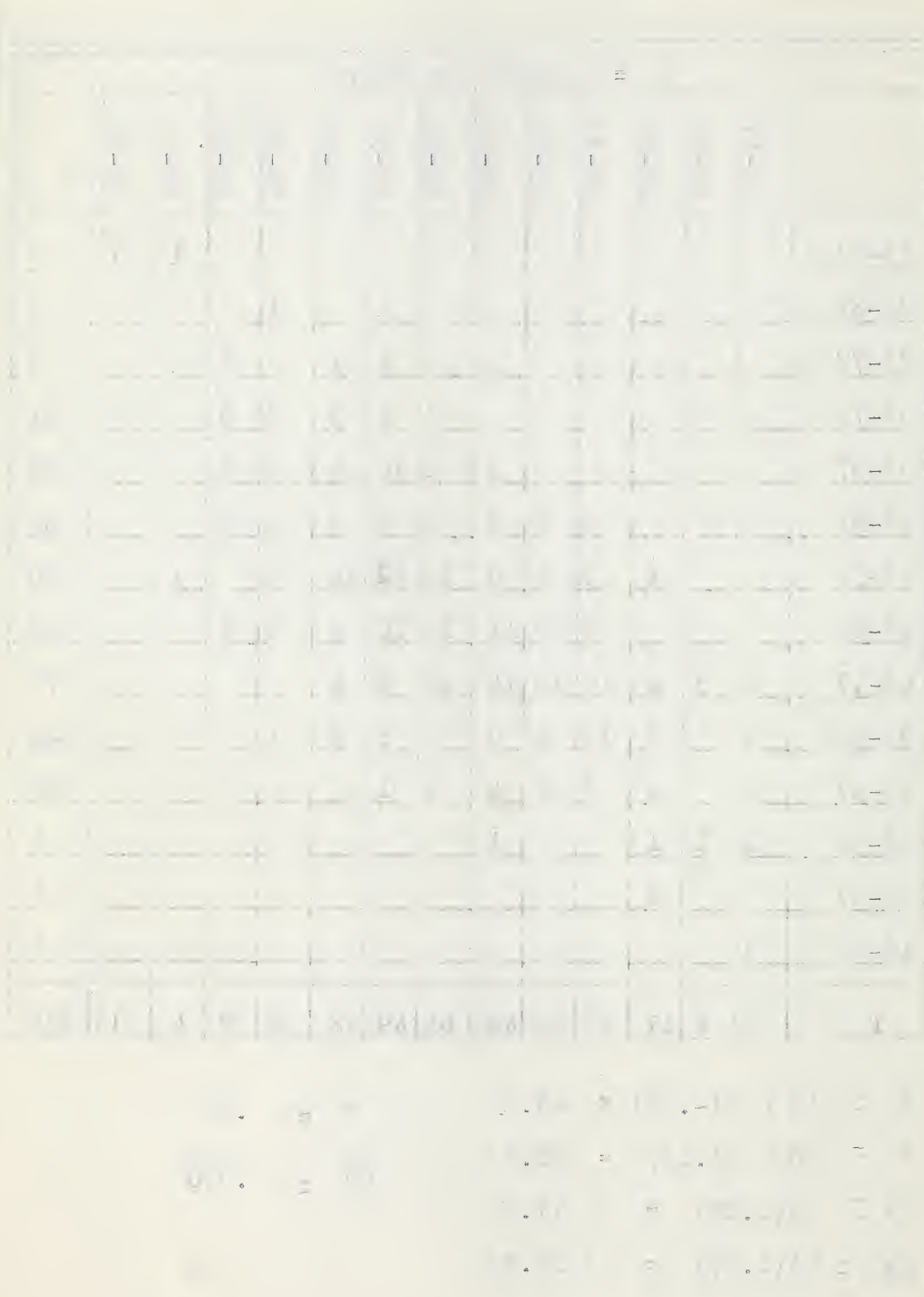
$\bar{Y} = 50 + 5(.14) = 50.7$

$\sigma_x = \pm 5(2.29) = \pm 11.5$

$\sigma_y = \pm 5(2.07) = \pm 10.35$

$r = .66$

$\sigma_r = \pm .030$



APPENDIX A

TABLE XIX

Bivariate Distribution of the Mental-Ability Scores and the Scores in Science and Health Education for 355 Grade IX Students

Y = Henmon-Nelson Score	X = Score in Science and Health Ed.																
	35-41	42-48	49-55	56-62	63-69	70-76	77-83	84-90	91-97	98-104	105-111	112-118	119-125	126-132	133-139	140-146	f
83-87															1	1	2
78-82													1	1			2
73-77												1		4		1	6
68-72										1	2	1	3	1	1	2	11
63-67							2	1	3	6	2	3	3	4	1	1	26
58-62	1					1	2	1	2	2	6	4	7	6	2	1	35
53-57			1	1		2	4	10	10	7	9	6	5	4	1		60
48-52				7	2	8	9	11	7	9	10	1	4		1		69
43-47	1	1	1	4	11	9	5	11	10	5	3	5	2	1	1		70
38-42			4	2	4	6	5	7	6	3	3	2	2				44
33-37			2	1	6	6	2	2	2	1	1						23
28-32		1		1	1			1									4
23-27					1	1											2
18-22	1																1
f	3	2	8	16	25	33	29	44	40	34	36	23	27	21	8	6	355

$\bar{X}$ = 94 + 7(.03) = 94.2

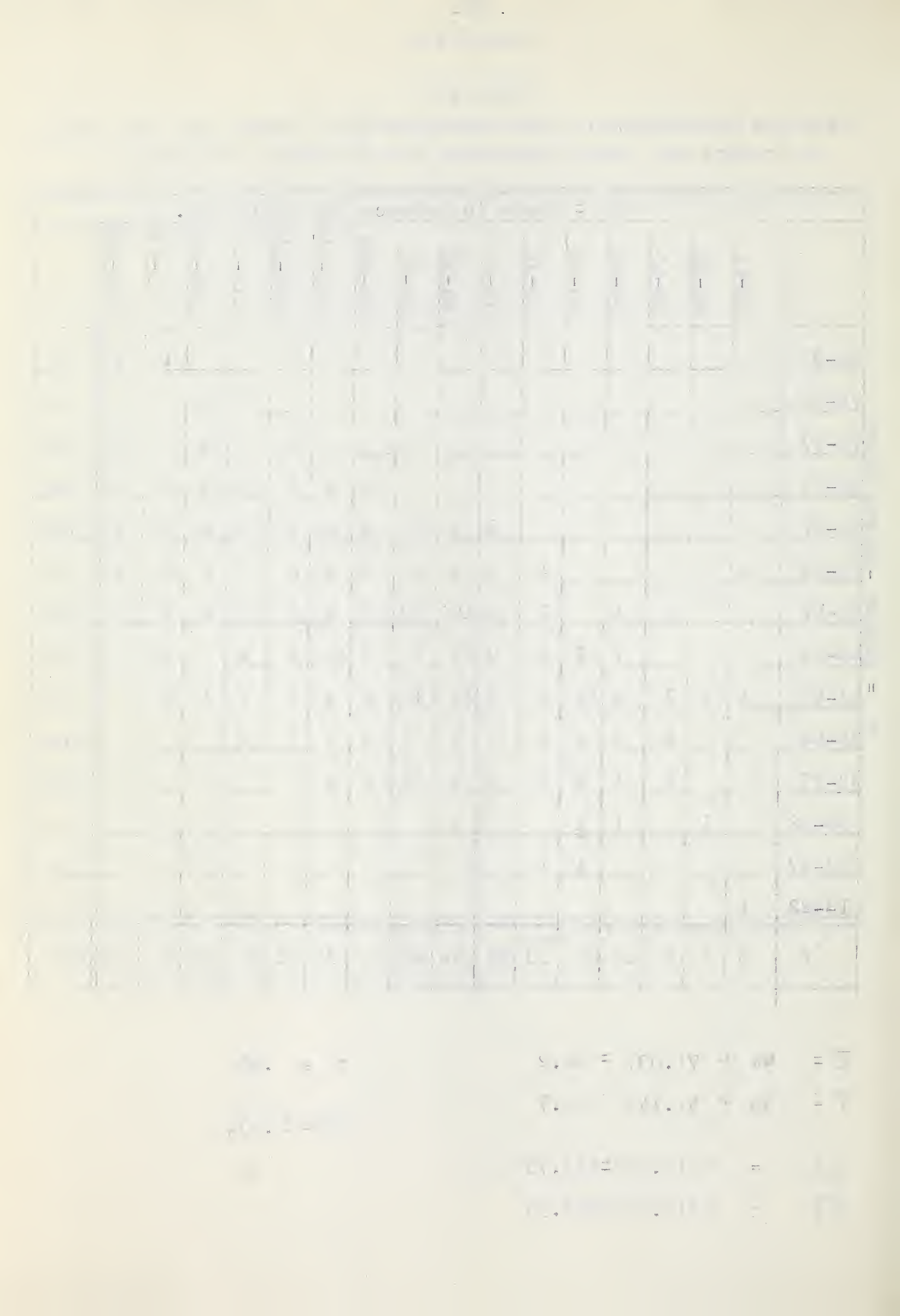
$\bar{Y}$ = 50 + 5(.14) = 50.7

r = .60

σ_r = ±.034

σ_x = ±7(3.25) = ±22.75

σ_y = ±5(2.07) = ±10.35



APPENDIX A

TABLE XX

Bivariate Distribution of the Scores on the Tests of Mental Ability and Reading (without the Vocabulary Sections) for 355 Grade IX Students

Y = Hennon-Nelson Score	X= Score on Read. (without Vocab.)																		
	2-4	5-7	8-10	11-13	14-16	17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40	41-43	44-46	47-49	50-52	f
83-87															1		1	2
78-82														1	1			2
73-77													1	4	1			6
68-72											1	1	4	3	2			11
63-67								1	3	1	8	5	6	2				26
58-62						1	1	4	2	9	4	7	5	1	1			35
53-57				1	1	2	5	7	10	12	7	8	7					60
48-52				1	1	2	12	9	19	10	7	3	3	2				69
43-47			1	3	5	9	13	15	10	13		1						70
38-42			3	3	4	9	8	8	2	3	3	1						44
33-37	1			4	5	6	2	2	1	2								23
28-32			1		1	1		1										4
23-27					1	1												2
18-22			1															1
f	1		6	12	18	31	41	47	47	50	30	26	26	13	6		1	355

$\bar{X} = 27 + 3(.01) = 27.0$

$\bar{Y} = 50 + 5(.14) = 50.7$

$r = .72$

$\sigma_r = \pm .026$

$\sigma_x = \pm 3(2.80) = \pm 8.40$

$\sigma_y = \pm 5(2.07) = \pm 10.35$

APPENDIX A

TABLE XXI

Bivariate Distribution of the Literature Scores and the Scores in Reading (without the Vocabulary Sections) for 355 Grade IX Students

Y = Literature Score	X Score on Reading (without Vocab.)																		
	2-4	5-7	8-10	11-13	14-16	17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40	41-43	44-46	47-49	50-52	f
73-77															1			1
68-72													1	1	1		1	4
63-67									1	2		1		4	1			9
58-62						1		1		3	2	5	6	5	1			24
53-57							1	4	2	10	3	9	11	2				42
48-52					1	1	4	8	7	4	12	6	4		2			49
43-47						4	12	6	13	13	5	4	3	1				61
38-42				1	1	8	5	12	10	8	2	1	1					49
33-37				2	4	3	8	9	9	6	5							46
28-32			3	4	7	6	8	7	4	3	1							43
23-27	1		1	4	4	4	2			1								17
18-22					1	2			1									4
13-17			2	1		2	1											6
f	1		6	12	18	31	41	47	47	50	30	26	26	13	6		1	355

$\bar{X} = 27 + 3(.01) = 27.0$

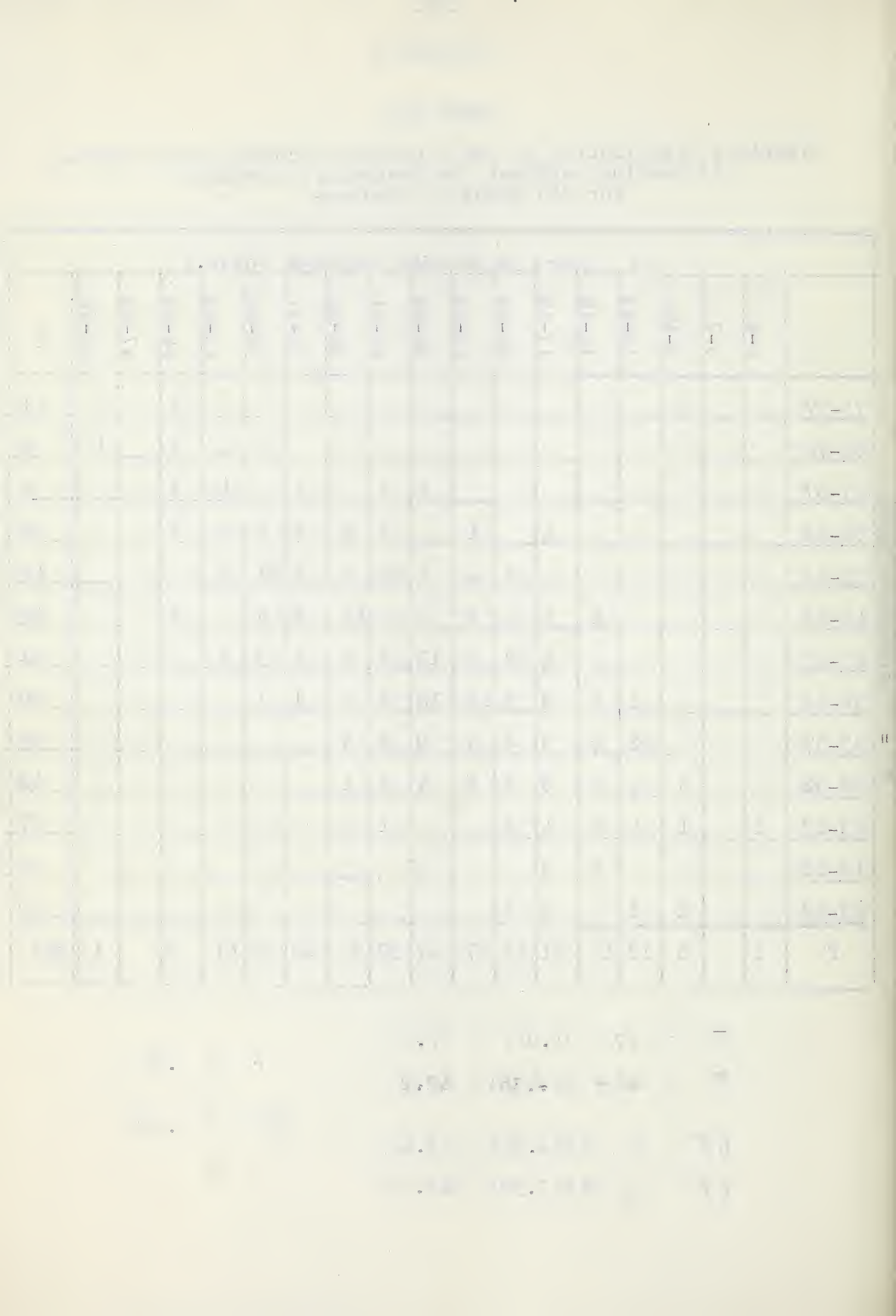
$\bar{Y} = 45 + 5(-.36) = 43.2$

$\sigma_x = \pm 3(2.80) = \pm 8.40$

$\sigma_y = \pm 5(2.30) = \pm 11.50$

$r = .71$

$\sigma_r = \pm .027$



APPENDIX A

TABLE XXII

Bivariate Distribution of the Scores in General Science and Health Education and the Scores in Reading (without the Vocabulary Sections) for 355 Grade IX Students

Y = General Science and Health Score	X = Score on Reading (without Vocab.)																	
	2-4	5-7	8-10	11-13	14-16	17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40	41-43	44-46	47-49	50-52	f
140-146										1		1		2	1		1	6
133-139											2	1	1	3	1			8
126-132						1		1	3	3	2	5	2	3	1			21
119-125					1	1		1	2	4	4	6	4	2	2			27
112-118						1	3	5	3	4	1	4	1		1			23
105-111				1	2	2	2	4	3	5	3	2	9	3				36
98-104				3	1	2	4	3	4	4	6	3	4					34
91-97			2	1	2	1	2	7	6	11	5		3					40
84-90			1	2	2	3	6	6	10	9	1	2	2					44
77-83					3	3	8	2	6	3	4							29
70-76	1		1	3	1	8	4	7	2	3	2	1						33
63-69			1	2	2	3	5	7	3	2								25
56-62					4	3	1	2	4	1		1						16
49-55						1	5	1	1									8
42-48						2												2
35-41			1				1	1										3
f	1		6	12	18	31	41	47	47	50	30	26	26	13	6		1	355

$\bar{X} = 27 + 3(.01) = 27.0$

$\bar{Y} = 94 + 7(.03) = 94.21$

$\sigma_x = \pm 3(2.80) = \pm 8.40$

$\sigma_y = \pm 7(3.25) = \pm 22.75$

$r = .55$

$\sigma_r = \pm .037$

APPENDIX A

TABLE XXIII

Bivariate Distribution of the Total Scores in Vocabulary and the Scores in Reading (without Vocabulary) for 355 Grade IX Students

Y = Total Vocabulary Score, Alberta Reading Test	X = Score on Reading (without Vocabulary)																	
	2-4	5-7	8-10	11-13	14-16	17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40	41-43	44-46	47-49	50-52	f
39-40												1					1	2
37-38														2	2			4
35-36								1	1					4				6
33-34										1		2	2	2	2			9
31-32								2	1	2	1	4	4	3	1			18
29-30								1	2	5	4	2	6					20
27-28						1	1	2	2	5	6	4	9	1	1			32
25-26						1	1	3	6	8	5	4	1					29
23-24				1	1	2	4	5	5	9	4	4	1	1				37
21-22				1	2	3	5	13	10	6	5	2	1					48
19-20				2	5	5	9	4	9	7	3	1	2					47
17-18				4	2	5	12	5	6	4	1	2						41
15-16			2		1	7	3	10	4	2	1							30
13-14	1		3	3	4	3	3	1	1									19
11-12				1	3	2												6
9-10							2			1								3
7-8			1			2	1											4
f	1		6	12	18	31	41	47	47	50	30	26	26	13	6		1	355

$\bar{X}$ = 27 + 3(.01) = 27.0

$\bar{Y}$ = 21.5 + 2(.38) = 22.3

σ_x = ± 3(2.80) = ± 8.40

σ_y = ± 2(3.11) = ± 6.22

r = .70

σ_r = ± .027

APPENDIX A

TABLE XXIV

Bivariate Distribution of the Scores in General Science and Health Education and the Scores in General Vocabulary for 355 Grade IX Students

Y = General Science and Health Education Score	X = Total Vocabulary Score, Alberta Reading Test																		
	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	31-32	33-34	35-36	37-38	39-40	f
140-146												1	1	1	1	1	1	6
133-139											2	2	2		2			8
126-132					1		1		1	3	2	3	5	2	1	2		21
119-125					1	1	2	2	3	2	5	4	4	2	1			27
112-118					1	1	2	2	5	3	2	1	2	2	1		1	23
105-111					2	2	2	4	6	6	7	3	2	1		1		36
98-104				1	1	5	5	5	3	5	5	3	1					34
91-97	1			1	1	4	5	13	4	4	5	2						40
84-90				2	4	8	6	11	7	1	3	1	1					44
77-83				3		5	8	4	5	2	1			1				29
70-76			2	5	7	9	5	1	2	2								33
63-69	1	1	3	1	7	3	5	4										25
56-62				3	3	3	3	2	1	1								16
49-55		2		2	2		2											8
42-48	1			1														2
35-41	1		1				1											3
f	4	3	6	19	30	41	47	48	37	29	32	20	18	9	6	4	2	355

$\bar{X} = 21.5 + 2(.38) = 22.3$

$\bar{Y} = 94 + 7(.03) = 94.2$

$r = .69$

$r = .028$

$x = \pm 2(3.11) = 6.22$

$y = 7(3.25) = 22.75$

APPENDIX A

TABLE XXV

Bivariate Distribution of the Scores in Literature and the Total Scores in Vocabulary for 355 Grade IX Students

Y = Literature Score	X = Total Vocabulary Score, Alberta Reading Test																	
	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	31-32	33-34	35-36	37-38	39-40	f
73-77																1		1
68-72											1			1		1	1	4
63-67											1	2	1	1	2	2		9
58-62						1	2		2		2	5	4	6	1		1	24
53-57					1	1	5	2	4	7	9	2	9		2			42
48-52				1	1	4	3	5	9	8	9	5	3	1				49
43-47				1	2	6	6	16	11	9	5	4			1			61
38-42					12	8	8	6	9	2	2	1	1					49
33-37			1	3	5	9	12	11		2	3							46
28-32	1	2	2	6	6	8	7	7	2	1		1						43
23-27	1		2	6	1	2	4	1										17
18-32	1		1			2												4
13-17	1	1		2	2													6
f	4	3	6	19	30	41	47	48	37	29	32	20	18	9	6	4	2	355

$\bar{X} = 21.5 + 2(.38) = 22.3$

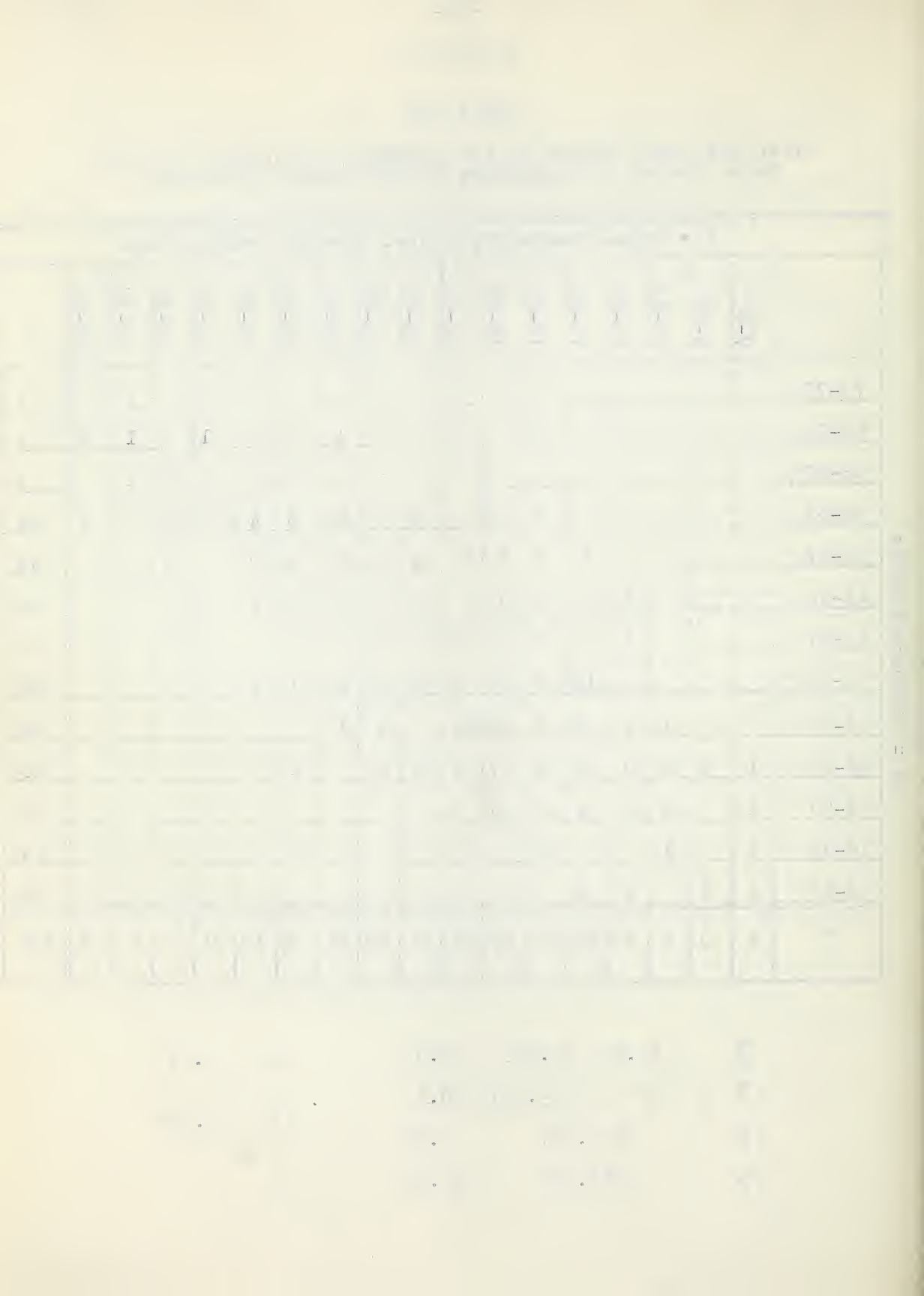
$\bar{Y} = 45 + 5(-.36) = 43.2$

$\sigma_x = 2(3.11) = 6.22$

$\sigma_y = 5(2.30) = 11.50$

$r = .74$

$\sigma_r = \pm .024$



APPENDIX B

TESTS AND ANSWER KEYS

(For the use of the Department only)

DEPARTMENT OF EDUCATION ALBERTA

HIGH SCHOOL ENTRANCE EXAMINATION BOARD

DEPARTMENTAL EXAMINATIONS, 1950

GRADE IX

READING TEST

Instructions to Candidate:

THIS TEST CONSISTS OF FOUR PARTS. DO NOT START ANY PART UNTIL YOU ARE TOLD BY THE PRESIDING EXAMINER TO DO SO. *Once you have started one part of the test continue until you have finished that part or are told to stop. If you should finish reading any part of the test before you are told to stop, wait quietly, or revise work on part just finished, until you are told to begin reading the next part. You are not to go back to a previous part.*

Time: Exactly twelve minutes reading time is allowed for each part of this test. The total time required for the test is about fifty minutes.

Value: The number of correct answers.

Note: This test has been adapted for machine scoring. Extreme care should be exercised when indicating answers on the special answer sheet provided. See that your answer is put in the proper place. It should have the same number as the question.

Be sure to mark your answer distinctly, using the pencil provided and making a heavy black mark. Ink or crayons must not be used. If you wish to change your answer, erase your first mark completely.

Each question has five suggested answers, only ONE of which is correct. Select the correct answer in each case and record your choice on the separate answer sheet provided, as shown in the sample below:

SAMPLE:

			Answer Sheet				
			a	*b*	*c*	*d*	*e*
The mass of air surrounding the earth is called the	*a*. oxygen *c*. membrane *e*. curtain	*b*. atmosphere *d*. sphere	⁞	▌	⁞	⁞	⁞

Do not write your name on the answer sheet.

DO NOT FOLD ANSWER SHEET.

The answer sheet should be enclosed in the answer envelope.

Few students will be able to complete all questions in any part of the test. Do as many as you can in the time allowed.

1	2	3

(For the use of sub-examiners only)

PART I

MARK ALL ANSWERS ON THE SCORE SHEET

(1) A word that is closely equivalent in meaning to another is said to be its

1. *a.* synonym *b.* foil *c.* simile *d.* antonym *e.* auxiliary

(2) A person who is frugal is

2. *a.* stingy *b.* economical *c.* generous *d.* unfriendly *e.* confused

(3) To be melancholy is to be

3. *a.* afraid *b.* happy *c.* gaunt *d.* tense *e.* gloomy

(4) When we say that there is an abundance of information, we mean that the amount of information is

4. *a.* niggardly *b.* obscure *c.* copious *d.* disarming *e.* stinted

(5) When we say that the hero is swarthy in appearance, we mean that he is

5. *a.* ugly *b.* stalwart *c.* fair complexioned *d.* handsome *e.* dark complexioned

(6) A metaphorical expression is

6. *a.* literal *b.* figurative *c.* illiterate *d.* dramatic *e.* rhythmical

(7) A puzzling situation is often said to be an

7. *a.* anecdote *b.* enigma *c.* allegory *d.* allusion *e.* anthology

(8) An epitaph is

8. *a.* a nickname *b.* an elegy *c.* an oration *d.* a rule *e.* an inscription

(9) A statement that is concise is

9. *a.* candid *b.* vague *c.* terse *d.* poetic *e.* quaint

(10) A silence that is ominous is

10. *a.* universal *b.* confusing *c.* threatening *d.* vagrant *e.* spontaneous

GO ON TO THE NEXT PAGE

When the triangle sounded in the morning, Jody dressed more quickly than usual. In the kitchen, while he washed his face and combed his hair, his mother addressed him irritably. "Don't you go out until you get a good breakfast in you."

He went into the dining-room and sat at the long white table. He took a steaming hotcake from the platter, arranged two fried eggs on it, covered them with another hotcake and squashed the whole thing with his fork.

His father and Billy Buck came in. Jody knew from the sound on the floor that both of them were wearing flat-heeled shoes, but he peered under the table to make sure. His father turned off the oil lamp, for the day had arrived, and he looked stern and disciplinary, but Billy Buck did not look at Jody at all. He avoided the shy questioning eyes of the boy and soaked a whole piece of toast in his coffee.

—*The Red Pony*

(11) This passage is chiefly about

11. *a.* flat-heeled shoes
b. Billy Buck
c. an irritable woman
d. a breakfast scene
e. an oil lamp

(12) The following are incidents mentioned in the passage above:
1. Billy Buck enters the house.
2. Jody begins his breakfast.
3. Jody's father turns off the lamp.
4. Jody combs his hair.
The order in which these incidents occurred is

12. *a.* 1, 2, 3, 4
b. 2, 1, 3, 4
c. 3, 4, 1, 2
d. 3, 4, 2, 1
e. 4, 2, 1, 3

A newspaper reporter tells of two bandits who entered the office of a manufacturing firm, covered the employees with pistols, and demanded the payroll. "Let 'em have it," said the proprietor to his employees, meaning that they should hand over to the holdup men the $550 payroll. The bandits thought the proprietor was telling someone to shoot them, so they opened fire. Two bullets struck and killed the proprietor. The bandits fled without the payroll.

—Kingsley

(13) The following are five incidents in the above story:
1. The proprietor was killed.
2. The bandits pointed their pistols at the employees.
3. The bandits entered the office.
4. The bandits fled.
5. The proprietor ordered his employees to hand over the payroll.

The order in which these incidents occurred is

13. *a.* 3, 2, 5, 1, 4
b. 3, 2, 4, 5, 1
c. 5, 3, 2, 1, 4
d. 5, 2, 3, 1, 4
e. 3, 5, 2, 1, 4

(14) This story depends for its success upon our understanding that

14. *a.* the payroll was saved
b. the expression, "Let 'em have it," meant something different to the proprietor and to the bandits
c. the proprietor showed great presence of mind in saying, "Let 'em have it."
d. the bandits hadn't expected any opposition
e. $550 is a large sum of money

When I heard the learned astronomer,
When the proofs, the figures, were ranged in columns before me,
When I was shown the charts and diagrams, to add, divide, and measure them,
When I, sitting, heard the astronomer where he lectured with much applause in the lecture room,
How soon unaccountable I became tired and sick,
Till, rising and gliding out, I wandered off by myself,
In the mystical moist night-air, and, from time to time,
Looked up in perfect silence at the stars.—*Whitman*

(15) The central meaning of the above poem is that the listener learned to appreciate the stars by

15. *a.* listening to astronomers lecture
b. studying charts and diagrams
c. making calculations about them
d. working out proofs about them
e. looking at them

The Sea Gypsy

I am fevered with the sunset
I am fretful with the bay,
For the wander-thirst is on me
And my soul is in Cathay.

There's a schooner in the offing
With her topsails shot with fire;
And my heart has gone aboard her
For the Island of Desire.

I must forth again tomorrow!
With the sunset I must be
Hull down on the trail of rapture
In the wonder of the sea.—*Richard Hovey*

(16) The chief idea in the above poem is that the speaker has

16. *a.* a desire to travel
b. a great yearning for sea life and travel
c. become tired of the sunset
d. decided to board a schooner
e. tired of travelling by sea

He pulled the mitten on hurriedly and stood up. He was a bit frightened. He stamped up and down until the stinging returned to his feet. It certainly was cold, was his thought. The man from Sulphur Creek had spoken the truth when telling how cold it sometimes got in the country. And he had laughed at him at the time! That showed one must not be too sure of things. There was no mistake about it, it *was* cold. He strode up and down, stamping his feet and threshing his arms, until reassured by returning warmth. Then he got out matches and proceeded to make a fire. From the undergrowth, where high water of the previous summer had lodged a supply of seasoned twigs, he got his fire-wood. Working carefully from a small beginning, he soon had a roaring fire, over which he thawed the ice from his face and in the protection of which he ate his biscuits. For the moment the cold of space was outwitted. The dog took satisfaction in the fire, stretching out close enough for warmth and far enough away to escape being singed.—*London*

(17) The best title to express the main idea of the above passage is

17. *a.* Winter in the Woods
b. Fighting against the Cold
c. How to Light a Fire in Winter
d. The Wisdom of a Dog
e. The Man from Sulphur Creek

(18) In the above passage the following incidents are mentioned:
1. A dog lies down.
2. A man lights a fire.
3. A man stamps his feet as he walks.
4. A man eats some food.
The order in which these incidents occur is

18. *a.* 1, 2, 3, 4
b. 2, 3, 1, 4
c. 3, 2, 4, 1
d. 4, 3, 2, 1
e. 4, 2, 3, 1

A Voice: In the King's name! (Mary and Stewart are startled.)

Mary: (Recovering first) The hay in the barn——quick, my son.

A Voice: Open in the King's name! (Stewart snatches up such articles as would reveal his presence, and hurries into the barn. He overlooks the dirk on the floor. The old woman goes towards the door, slowly, to gain time.)

Mary: Who is there? What do you want?

A Voice: Open, open (Mary opens the door, and Campbell of Kilmohr follows Captain Sandeman into the house. Behind Kilmohr comes his clerk. They are followed by soldiers.)

Sandeman: Ha, the bird has flown.

Campbell: (Who has struck the dirk with his foot and picked it up) But the nest is warm; look at this.

Sandeman: It seems as if we had disturbed him at supper. Search the house, men.

Mary: I'm a lonely old woman. You have been misguided. I was getting through my supper.

Campbell: (Holding up the dirk) And this was your toothpick, eh? No! No! We know where we are, and what we want, and, I think we've got him.

(Sounds are heard from the barn, and soldiers return with Morag. She has stayed in hiding from fear, and she still holds the cheese in her hands.)

Sandeman: What have we here?

Campbell: A lass!

Mary: It's just my dead brother's daughter. She was getting me the cheese as you can see.

Campbell: On men, again; the other turtle dove will not be far away. Tut, tut, Mistress Stewart, and do you have her wait upon you while your ladyship dines alone! A grand way to treat your dead brother's daughter. Fie, fie, upon you!

(Soldiers reappear with Stewart, whose arms are pinioned.)

Campbell: Did I not tell you! And this, Mrs. Stewart, will be your dead sister's son, I'm thinking; or perhaps your ladyship's butler! Well, woman, I'll tell you this: Pharaoh spared one butler, but Archie Campbell will not spare another. No! No! Pharaoh's case is not to be taken as forming a precedent. And so if he doesn't answer certain questions we have to ask him, before morning he'll hang as high as Haman.

GO ON TO THE NEXT PAGE

(19) The above passage is mainly about

19. *a.* an escape from the law
b. a lonely woman
c. the capture of a fugitive
d. a disturbed supper
e. a hay barn

(20) The clue left by Stewart when he hides in the barn is a

20. *a.* toothpick *b.* cheese
c. rifle *d.* dirk
e. warm nest

(21) The strongest character in this scene is

21. *a.* Stewart *b.* Morag
c. Sandeman *d.* Mary
e. Campbell

(22) The person who is threatened with hanging in this scene is

22. *a.* Stewart *b.* Morag
c. Haman *d.* Mary
e. Campbell

YOU HAVE NOW REACHED THE END OF PART I. DO NOT TURN TO THE NEXT PAGE UNTIL THE PRESIDING EXAMINER TELLS YOU TO DO SO.

PART II

(23) The figure which is a trapezoid is

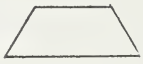
23.

a. 

b. 

c. 

d. 

e. 

(24) The amount paid to an agent for his services in buying or selling goods or property for another is called his

24. *a.* commission *b.* tariff *c.* patronage *d.* mortgage *e.* assessment

(25) A self-evident truth is called

25. *a.* an equation *b.* an axiom *c.* an hypothesis *d.* a proof *e.* a theory

(26) From the equation $x - 7 = 0$, x is found to be equal to 7 by

26. *a.* transposing *b.* eliminating *c.* alternating *d.* revolving *e.* inverting

(27) To verify means to

27. *a.* illustrate *b.* balance *c.* estimate *d.* prove *e.* substitute

(28) A line which cuts across a system of other lines is called

28. *a.* a diagonal *b.* a chord *c.* a transversal *d.* an intercept *e.* a perpendicular

(29) The yearly payment made to a life insurance company for protection is called the

29. *a.* brokerage *b.* payment *c.* assessment *d.* premium *e.* tariff

(30) Figures which are identical in shape but not in area are

30. *a.* congruent *b.* identical *c.* symmetrical *d.* similar *e.* equilateral

(31) When the minuend is reduced by the subtrahend the result is called the

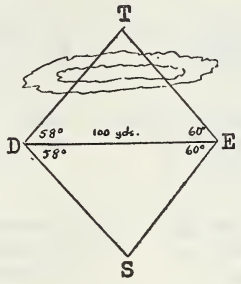
31. *a.* sum *b.* remainder *c.* quotient *d.* product *e.* amount

(32) A straight line which joins the vertex of a triangle to the mid-point of the opposite side is called

32. *a.* a median *b.* a coefficient *c.* a locus *d.* a binomial *e.* an axis

GO ON TO THE NEXT PAGE

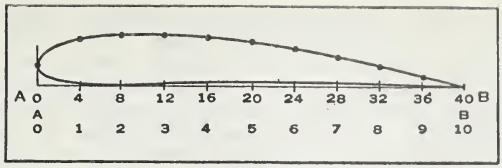
Bob and Ted were standing at a point D and shooting at a target T across a small pond. They wondered how far the target at point T was from where they stood. First they measured off a distance from D to E equal to 100 yards. Then they sighted T from D and found that angle EDT was equal to 58°. Next they sighted T from E and found that angle DET was equal to 60°. On the opposite side of DE they made angle EDS equal to 58° and angle DES equal to 60°. Then they drew and extended the lines DS and ES to meet at S. They measured DS. They knew that this was the same as the distance DT.



(33) The following are steps used by Bob and Ted in solving the problem above:
1. They made angle EDS = angle EDT and angle DES = angle DET.
2. They measured DS.
3. They measured DE = 100 yards.
4. They found the size of the angles EDT and DET.

The order in which the above steps were performed in solving the problem is

33. *a.* 3, 4, 1, 2
b. 3, 4, 2, 1
c. 2, 3, 4, 1
d. 3, 2, 4, 1
e. 4, 1, 3, 2



The figure above is the shape of a cross section of one form of airplane wing. It is a scale drawing of a cross section whose *chord* AB is 40 inches.

The upper and lower curves, called *cambers,* of this cross section are specified by percentages of chord AB, as given in the following table:

At position	0	1	2	3	4	5	6	7	8	9	10
Distance: % of AB	0	10	20	30	40	50	60	70	80	90	100
Height of upper curve: % of AB	3.37	10.13	12.01	12.42	12.10	11.04	9.57	7.68	5.51	3.06	.40

—*Basic Mathematics*

(34) The highest point on the upper curve or camber is at the position

34. *a.* 1 *b.* 2 *c.* 3 *d.* 4 *e.* 5

(35) The height of the upper curve or camber is expressed as

35. *a.* a cross section of the wing
b. a percentage of chord AB
c. a length in inches
d. a length in feet
e. a percentage of the height of the wing

It is surprising how long it took the world to develop a good symbolism for algebra. Although geometry was well known to the Greeks, they never succeeded in working out a satisfactory number system. All early writers except Diophantus used the full word or an abbreviation for it, so that their equations were more like rules than modern equations. Diophantus (275 A.D.) used many symbols but his work had little influence on later mathematics, for all through medieval times, no satisfactory symbols were used for even the operations of arithmetic. Plus (+) and minus (—) seem to have been first used in Widman's arithmetic (1489) in Germany. The multiplication sign (×) appeared in England in 1600. Our equality sign (=) was first used by Recorde, an Englishman, in 1557. Before his time the whole word or an abbreviation of it had been used. Vieta (1590), a French mathematician, used letters to represent both known and unknown numbers. His is the earliest book to resemble a modern text in algebra.

—*Mathematics for Modern Life*

(36) This passage is chiefly about

36. *a.* Diophantus' contribution to mathematics
b. the relationship of algebra to geometry
c. the history of mathematics
d. the development of symbols for algebra
e. mathematics among the Greeks

(37) The only English mathematician mentioned in the above passage is

37. *a.* Diophantus *b.* Widman
c. Descartes *d.* Vieta
e. Recorde

(38) According to the above passage, the order in which mathematical symbols were introduced is

38. *a.* +, ×, =, letters to represent numbers
b. letters to represent numbers, +, ×, =
c. letters to represent numbers, +, =, ×
d. +, =, ×, letters to represent numbers
e. +, =, letters to represent numbers, ×

GO ON TO THE NEXT PAGE

Summary of Pensions for Blind Persons, by Provinces
as at June 30, 1947

Province or Territory	Total Pensioners	Average Monthly Pension	Pensions to Total Population	Federal Government's Contribution since 1937
Prince Edward Island	119	$22.81	0.127%	$ 162,644
Nova Scotia	690	24.23	0.113	1,075,018
New Brunswick	761	24.65	0.159	1,252,153
Quebec	2,742	24.65	0.076	4,007,972
Ontario	1,634	24.71	0.040	2,651,690
Manitoba	395	24.76	0.054	583,279
Saskatchewan	381	24.79	0.046	564,305
Alberta	285	24.51	0.036	398,400
British Columbia	376	24.49	0.037	566,778
Northwest Territories	1	25.00	0.008	325
CANADA	7,384	.....	.....	$11,262,564

—*Canada 1948*

(39) According to the above table, the province which has the highest percentage of blind pensioners to the total population is

39. *a.* Quebec
b. Prince Edward Island
c. Nova Scotia
d. New Brunswick
e. Alberta

(40) According to the above table, the western province or territory which pays the lowest average monthly pension to blind pensioners is

40. *a.* Manitoba
b. Saskatchewan
c. Alberta
d. British Columbia
e. Northwest Territories

(41) According to the above table, the eastern province which received the smallest contribution from the federal government for blind pensioners since 1937 is

41. *a.* Prince Edward Island
b. Nova Scotia
c. New Brunswick
d. Quebec
e. Ontario

GO ON TO THE NEXT PAGE

When we look at the sporting page of a newspaper we see many uses of percents. Notice this copy of a table that gives the standing of the Wheatland Baseball League near the end of a recent season. It shows that the Cubs had won (W) 48 games to date and lost (L) 28. They had played 76 games altogether. Since the Cubs had won 48 of the 76 games played they had won 48/76 of their games. Newspapers print this fraction as a decimal correct to the nearest thousandth. So you find .632 as the "percentage" (Pct.) for the Cubs team. Although this figure is printed as a decimal, we usually read it as points and think of it as a per cent. The baseball fan who saw this in a newspaper would probably say, "The Cubs' standing is 632". By this he would mean that the Cubs had won 63.2% of the games played.

Wheatland Baseball League

Team	*W*	*L*	*Pct.*
Cubs	48	28	.632
Tigers	49	32	.605
Dodgers	42	32	.568
White Sox	39	36	.520
Raiders	41	38	.519
Monarchs	33	42	.440
Bruins	33	44	.429
Rangers	21	54	.280

(42) The chief purpose for which the above passage was written is to show that

42. *a.* the Cubs stand first in the Wheatland Baseball League
b. there are examples of per cent on the sporting pages of newspapers
c. the Cubs had won 63.2% of all games played
d. baseball scores are expressed as decimals correct to thousandths
e. the percent 63.2 is more accurate than 48/76

(43) The total number of games played by the Bruins is

43. *a.* 33 *b.* 44 *c.* 77 *d.* 429 *e.* 76

(44) In the above passage the following were done:
1. A fan read the Cubs' standing as 632.
2. The total number of games played by the Cubs was found.
3. The newspapers printed the Cubs' standing as .632.
4. The number of games won by the Cubs was found.

The order in which these incidents occurred is

44. *a.* 1, 2, 4, 3
b. 1, 4, 2, 3
c. 3, 4, 2, 1
d. 4, 2, 3, 1
e. 4, 2, 1, 3

YOU HAVE NOW REACHED THE END OF PART II. DO NOT TURN TO THE NEXT PAGE UNTIL THE PRESIDING EXAMINER TELLS YOU TO DO SO.

PART III

(45) A rule or law which operates in the functioning of a machine is called

45. *a.* a principle *b.* an edict *c.* a proclamation *d.* an enzyme *e.* a principal

(46) To make a solution weaker by the addition of water is to

46. *a.* dilate it *b.* neutralize it *c.* dilute it *d.* diminish it *e.* oxidize it

(47) A substance which evaporates quickly is said to be

47. *a.* insoluble *b.* soluble *c.* buoyant *d.* volatile *e.* non-corrosive

(48) A substance which is watery is

48. *a.* gaseous *b.* aqueous *c.* porous *d.* viscous *e.* opaque

(49) One who is protected from a disease by inoculation is

49. *a.* pasteurized *b.* inert *c.* impervious *d.* uncontaminated *e.* immune

(50) The process by which water is purified by passing it through successive layers of sand and gravel is

50. *a.* sedimentation *b.* aeration *c.* filtration *d.* distillation *e.* deflection

(51) To illuminate a room means to

51. *a.* paint it *b.* light it up *c.* redecorate it *d.* weave a new carpet for it *e.* open it

(52) *Residue* means

52. *a.* crystalline *b.* basic *c.* new *d.* ore *e.* remainder

(53) *Saturated* means

53. *a.* heavy *b.* fermented *c.* unhappy *d.* aesthetic *e.* soaked

(54) A space entirely empty of all matter is a

54. *a.* balloon *b.* vacuum *c.* plane *d.* faucet *e.* sphere

GO ON TO THE NEXT PAGE

Nowadays lighthouses are found on every coast along which ships sail. When several lighthouses are near one another, sailors distinguish them either by the color of their lights or by the varying degrees of brightness at different times. In many cases the lantern revolves showing, one after another, a red, a white, and a green light. Others have a revolving shutter placed in front of the light, which causes it to make long and short flashes so many times per minute. From these differences the mariner can always tell just which light he is approaching, and thus he knows where he is. Behind the light is placed a concave mirror, which makes the rays of light shoot forward in parallel lines and reach out to a very great distance.

—*Conquering the World with Science*

(55) The main idea in this passage is

55. *a.* there are many lighthouses along the coast
b. lighthouses are of different sizes
c. lighthouses have not changed much in recent years
d. devices are now used to make lighthouses more useful to sailors
e. the usefulness of lighthouses is increased by the use of concave mirrors

(56) The distance at which the light from a lighthouse may be seen is increased by the use of

56. *a.* concave reflectors
b. red, white, and green lamps
c. revolving shutters
d. having lighthouses closer together
e. binoculars

(57) The following ideas are mentioned in the above passage:
1. Some lighthouses show long and short flashes of light.
2. Some lighthouses show red, white, and green lights.
3. A concave mirror is placed behind some lights.

The order in which these ideas are mentioned is

57. *a.* 1, 2, 3
b. 2, 3, 1
c. 3, 1, 2
d. 1, 3, 2
e. 2, 1, 3

The fungi include more than seventy thousand species besides the many kinds of bacteria. Some fifteen hundred of them belong to the group called *algal fungi.* They are much like green algae except that they do not have chlorophyll. Many thousands belong to the *club fungi,* which get their name from the fact that they bear spores on the stalks, or "clubs". Even more belong to the *sac fungi,* all of which bear spores in tiny sacs. The *slime molds* make up still another group of fungi, but not a very large one. None of these four groups of fungi can make their own food. They are all dependent plants: they all depend, that is, on other plants or animals for their food.

Even though you may never have heard of the groups of fungi just named, you are almost sure to know some of the plants that belong to these groups. Among them are the yeasts, molds, mushrooms, and grain rusts.

—*The Plant World*

(58) The main purpose of this passage is to

58. *a.* tell an interesting story
b. explain how fungi grow
c. classify fungi
d. give examples of each class of fungi
e. tell how many species of fungi there are

(59) The characteristics which all of these fungi have in common is that they

59. *a.* are green in color
b. bear spores on stalks
c. bear spores in sacs
d. grow in slime
e. are dependent on other plants or animals for their food.

(60) The group of fungi with the largest number of species is the group of

60. *a.* algal fungi *b.* club fungi
c. sac fungi *d.* slime fungi
e. none of these

(61) From the information given in the passage above we conclude that mushrooms are

61. *a.* algal fungi *b.* club fungi
c. sac fungi *d.* slime fungi
e. fungi, but that we have insufficient information to tell the group to which they belong

GO ON TO THE NEXT PAGE

At least two species of native Canadian animals are extremely fond of mushrooms. The mountain caribou, common in certain areas of British Columbia, will purposely walk far for a mouthful of the choice morsels. Pine squirrels frequently scour the forest floor in search of their favorite mushroom—that known as *boletus*. In autumn these active woodland animals store quantities of mushrooms for winter use, placing them on the flat branches of spruce trees where they are dehydrated, and remain edible throughout the season of frost and snow. It is noteworthy that the high branches on which the fungi are dried and stored are out of reach of mice and mule deer. Apparently squirrels have no worries concerning unwholesome toadstools—they eat freely of varieties that to man are deadly.—*McCowan.*

(62) This passage is chiefly about

62. *a.* mushrooms *b.* toadstools
c. storage of food for winter
d. animals of British Columbia
e. some food habits of animals

(63) The pine squirrels store their winter supply of mushrooms

63. *a.* on the ground at the foot of trees
b. in the hollows of spruce trees
c. on the low flat branches of spruce trees
d. on the high flat branches of spruce trees
e. in the grass near their winter homes

(64) The following are mentioned in the above passage:
1. pine squirrels
2. mule deer
3. mountain caribou
4. boletus
The order in which these are introduced is

64. *a.* 1, 2, 3, 4
b. 1, 2, 4, 3
c. 3, 1, 4, 2
d. 3, 1, 2, 4
e. 2, 3, 1, 4

Today the filaments of our light-bulbs are made of tungsten. Each tiny tungsten wire is formed into a very close spring-like coil so that each turn of wire helps keep its neighbors hot. The large bulbs are filled with the gas argon. Argon is a very inactive chemical agent; that is, it does not combine easily with other substances. Therefore it does not change the tungsten. It is put into the bulb to keep the tungsten from evaporating as rapidly as it would in a vacuum. These improvements allow us to get seven times as much light from electricity as could be got from the carbon-filament bulb. But still we receive less than three per cent of the electrical energy in the form of light. Our light-bulbs are better heaters than "lighters".—*Science Problems.*

(65) This passage is chiefly about

65. *a.* the filaments used in light-bulbs
b. how improvements have increased the effectiveness of light-bulbs
c. the purpose of coils in a tungsten filament
d. the value of argon for filling light bulbs
e. the effectiveness of light-bulbs for heating

(66) The percent of electrical energy received as light by using efficient light-bulbs is approximately

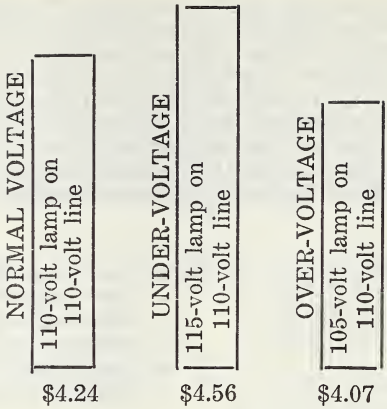
66. *a.* 7 *b.* 3
c. 93 *d.* 97
e. 100

(67) The following represent five phases of a situation which John Smith experienced:

1. He ran to shelter. No sooner did he reach shelter than a downpour occurred.
2. He decided that, if he did not hurry, the storm would overtake him.
3. He proved that his hypothesis was correct.
4. He saw that the cloud was black. It was then moving quite rapidly. It reminded him of similar clouds he had seen.
5. He saw a cloud approaching from the west.

The order in which these five phases occurred in the mind of John Smith as he used the experimental method is

67. *a.* 1, 2, 3, 4, 5
b. 2, 5, 4, 1, 3
c. 5, 4, 2, 1, 3
d. 2, 5, 4, 1, 3
e. 5, 4, 1, 2, 3



Above is a chart to show the relative costs of operating a lamp at normal voltage, under-voltage, and over-voltage.—*Science.*

(68) From the standpoint of increasing economy the best order of operation is

68. *a.* under-voltage, normal voltage, over-voltage
b. normal voltage, under-voltage, over-voltage
c. normal voltage, over-voltage, under-voltage
d. over-voltage, under-voltage, normal voltage
e. over-voltage, normal voltage, under-voltage

YOU HAVE NOW REACHED THE END OF PART III. DO NOT TURN TO THE NEXT PAGE UNTIL THE PRESIDING EXAMINER TELLS YOU TO DO SO.

PART IV

(69) *To veto* means to

69. *a.* quarrel *b.* sign *c.* forbid *d.* disagree *e.* advocate

(70) An *edict* is a

70. *a.* decree *b.* tariff *c.* tax *d.* pension *e.* judge

(71) One who makes no allowance for the opinions of others is said to be

71. *a.* frightful *b.* indecent *c.* virtuous *d.* intolerant *e.* reserved

(72) The separating of one nation from another by a policy of non-cooperation and non-interference is called

72. *a.* isolationism *b.* civilization *c.* conservatism *d.* ratification *e.* treason

(73) Public utilities are

73. *a.* services *b.* decisions *c.* demonstrations *d.* meetings *e.* pamphlets

(74) The right to vote is called the

74. *a.* referendum *b.* embargo *c.* franchise *d.* petition *e.* indenture

(75) A government's revenue is its

75. *a.* expenses *b.* majority *c.* policy *d.* commission *e.* income

(76) That part of the government which makes the laws is called the

76. *a.* executive *b.* legislature *c.* administration *d.* judiciary *e.* embassy

(77) Trade by exchange of goods rather than by the use of money is called

77. *a.* barter *b.* interdependence *c.* reciprocity *d.* tolerance *e.* consumption

(78) An area that is congested is said to be

78. *a.* very cold *b.* over-crowded *c.* rural *d.* polar *e.* tropical

GO ON TO THE NEXT PAGE

Would you like to take a personal part in the United Nations? You can do so without knowing a thing about diplomatic protocol, committee procedure, or how or when to hurl a veto.

All you have to know is that twenty million children in this world haven't enough to eat, enough to wear, or enough medicine to keep them well. All you have to do is send a dollar (or more if you can spare it) to UNICEF, Ottawa, Canada.

UNICEF is short for United Nations International Children's Emergency Fund. It's the only branch of UN that asks help from citizens as well as governments. It has already helped save the lives of some six million children in more than fifty countries in both hemispheres.

But UNICEF's funds are running low. Our Government has contributed six millions, will soon give another one million dollars. But all of us can do something toward redressing one of war's greatest injustices—the misery, disease, and starvation it inflicts on innocent youngsters.

—Maclean's.

(79) This paragraph is mainly about

79. *a.* the many services of UN.
b. the need of aid for UNICEF
c. the UN protocol
d. Government contributions to UNICEF
e. the UN veto

(80) The following are ideas stated in the above paragraph:
1. The Canadian Government has contributed millions to UNICEF.
2. We may share in the work of the UN without knowing the details of its procedures.
3. UNICEF is the only branch of the UN which asks aid from both governments and individuals.
4. Twenty million children in the world are starving.

The order which these ideas follow in the above passage is

80. *a.* 2, 4, 3, 1
b. 2, 4, 1, 3
c. 4, 2, 3, 1
d. 4, 2, 1, 3
e. 1, 2, 3, 4

GO ON TO THE NEXT PAGE

America's heavily burdened taxpayers may find explanation if not comfort, from a demonstration centuries ago of how money dwindles in the hands of officials when there is a multiplication and concentration of power in government bureaus.

The occasion was a great state banquet given by Frederick the Great and attended by courtiers and noblemen of his realm.

"Gentlemen," the sovereign complained, "although we levy new taxes and duties, our revenues continue to diminish. Can you find a solution for this problem?"

Expressions of various economic theories came thick and fast from various wise men present, until an old general, one Ziethen by name, stood up and motioned for silence.

"If your majesty desires," he remarked drily, "I will show you what happens to the money."

Removing a large chunk of ice from a wine pitcher, and lifting it high for the inspection of all, he handed it to his neighbor and requested that it be passed on from hand to hand, down the long table to the King. By the time it reached Frederick it was about the size of a pea.

"Now," said the old soldier, "does your Majesty understand why the money is so pitifully reduced by the time it reaches your coffers?"

In the strange silence which followed, a grim, unsmiling sovereign replied that he did.

(81) The writer of this passage directs its idea chiefly to

81. *a.* King Frederick
b. Ziethen
c. the courtiers and noblemen
d. American taxpayers
e. old generals

(82) The central idea in the above passage is

82. *a.* money is the root of all evil
b. ice melts if it is passed from hand to hand
c. a king always taxes his people heavily
d. a highly organized and centralized government is costly
e. Ziethen was a clever man

(83) The following are four incidents from the above passage:
1. A wise man speaks.
2. American taxpayers wonder why they have to pay high taxes.
3. A king asks for an explanation.
4. An old story is begun.
The order in which these incidents are introduced in the above passage is

83. *a.* 1, 2, 3, 4
b. 2, 1, 3, 4
c. 3, 2, 1, 4
d. 2, 3, 1, 4
e. 2, 4, 3, 1

Greece grew partly by war, but much more by trade. In earlier times the vessels that plied across the Aegean from the mainland to the islands, carrying goods of various kinds, were not Greek. They belonged to another race, from whom the Greeks learned much, the Phoenicians. The home of these people—so called by the Greeks because of their darker skin—was in Tyre and Sidon, rich cities on the coast of Syria. They sent out trading vessels to all different quarters of the world. While the Greeks were still home-keeping farmers living poorly on their land, rude people with little art or knowledge beyond that of war or husbandry, the Phoenicians were highly civilized, like the people of Egypt. They had discovered the art of writing: they had an alphabet. They were skilled workers in metals. They knew how to dye woollen stuffs in rich hues. They used weights and measures and some rude sort of money.—*Greece.*

(84) The main topic of the above passage is

84. *a.* Phoenician trade on the Aegean Sea
b. the growth of Greece as a trading nation
c. some aspects of Phoenician civilization
d. the civilization of Egypt
e. the wars of Greece

(85) From the passage above we learn that the Egyptians

85. *a.* discovered the art of writing
b. were more like the Greeks than like the Phoenicians
c. carried on trade with the Phoenicians
d. were a highly civilized people
e. were unknown to the Greeks

(86) It is quite clear from the above passage that

86. *a.* the Greeks depended on the Egyptians for much of their knowledge
b. the Phoenicians had learned many of their skills from the Egyptians
c. the Phoenicians were more important than the Greeks
d. the Greeks and the Phoenicians were trade rivals
e. the Phoenicians and Egyptians developed their civilizations before the Greeks became highly civilized

Prime Minister St. Laurent has announced the appointment of Right Honorable Vincent Massey, Chancellor of the University of Toronto, as Chairman of the Royal Commission on National Development in the Arts, Letters, and Sciences. Besides Mr. Massey other members of the Royal Commission are: Arthur Surveyor, 71, Montreal civil engineer; President Norman MacKenzie, 55, of the University of British Columbia; Rev. Georges-Henri Levesque, 46, dean of social sciences at Laval University; and Dr. Hilda M. A. Neatby, acting head of the department of history at the University of Saskatchewan.

—*World Affairs.*

(87) The only woman member of this commission is

87. *a.* Massey *b.* Surveyor *c.* MacKenzie *d.* Levesque *e.* Neatby

(88) The chairman of the commission is

88. *a.* Massey *b.* Surveyor *c.* MacKenzie *d.* Levesque *e.* Neatby

(89) The only member of this commission who is not mentioned as being connected with a university is

89. *a.* Massey *b.* Surveyor *c.* MacKenzie *d.* Levesque *e.* Neatby

Land conservation activities are being continued under the Prairie Farm Rehabilitation Act. The Act was passed in April, 1935 "to provide for the rehabilitation of drought and soil-drifting areas in the provinces of Manitoba, Saskatchewan and Alberta". Emphasis is placed upon assistance to farmers in the development of water supply and improved farm practices. Under the terms of this Act the Minister of Agriculture is authorized to introduce throughout the affected area those "systems of farm practice, tree culture, and water supply that will afford greater economic security to the agriculture population." By an amendment to the Act in March 1937 "land utilization and land settlement" were included as additional objectives, while a later amendment in March, 1939, removed the original five-year limit to the life of the Act.—*Canada 1948.*

(90) This passage is chiefly concerned with

90. *a.* soil drifting *b.* irrigation *c.* immigration *d.* land conservation *e.* tree culture

(91) The activities under the Prairie Farm Rehabilitation Act

91. *a.* came to an end in 1935
b. came to an end in 1937
c. came to an end in 1939
d. came to an end in 1948
e. are still going on

READING TEST - GRADE IX — 1950

(For the use of the Department only)

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(For the use of the Department only)

HIGH SCHOOL ENTRANCE EXAMINATION BOARD

DEPARTMENTAL EXAMINATIONS, 1950

GRADE IX

ENGLISH — PART I

LITERATURE

Time—1 hour.

Note—The total time allowed for this paper is ONE HOUR.

Distribute this time to best advantage, reading the paper, answering the questions and reviewing the work already done.

Do not spend too much time on any one question.

Do not write your name on this booklet.

DO NOT FOLD BOOKLET.

All your work must be done in this booklet.

All your work should be done in ink.

1	2	3

(For the use of sub-examiners only)

Values

1. *Proud Maisie*

Proud Maisie is in the wood,
Walking so early;
Sweet Robin sits on the bush
Singing so rarely.

"Tell me, thou bonny bird,
When shall I marry me?"
"When six braw gentlemen
Kirkward shall carry ye."

"Who makes the bridal bed,
Birdie, say truly?"
"The gray-headed sexton
That delves the grave duly.

"The glow-worm o'er grave and stone
Shall light thee steady.
The owl from the steeple sing,
'Welcome, proud lady'."

3 **(a)** The above poem is a short ballad. State three characteristics of ballad poetry which appear in it.

(1) .....

(2) .....

(3) .....

1 **(b)** What event is described in the last two lines of the second stanza?

.....

1 **(c)** To what place is the owl welcoming Maisie as he sings, "Welcome, proud lady"?

.....

1 **(d)** What is the most likely nationality of the writer of this poem?
(1) English (2) Scotch (3) Canadian (4) French (5) American
Answer by number. (.....)

1 **(e)** The word *delves* in line 12 means:
(1) opens (2) builds (3) digs (4) designs (5) prepares
Answer by number. (.....)

Values

2. Read the following paragraph and do the exercises which follow it.

I turned up the dull and stinking oil lamp, and tried to read; but that fuliginous glim haunted the pages. That black-edged light too much resembled my own thoughts made manifest. There were some bunches of my cabin-mate's clothes hanging from hooks, and I watched their erratic behaviour instead. The water in the carafe was also interesting, because quite mad, standing diagonally in the bottle, and then reversing. A lump of soap made a flying leap from the washstand, and then slithered about the floor like something hunted and panic-stricken. I listened to numerous little voices. There was no telling their origins. There was a chorus in the cabin, whispers, plaints, creaks, wails, and grunts; but they were foundered in the din when the spittoon, which was an empty meat tin, got its lashings loose, and began a rioting fandango on the concrete. Over the clothes chest, which was also our table and a cabin fixture, was a portrait of the mate's sweetheart, and on its frame was one of my busy little friends the cockroaches; for the mate and I do not sleep alone in the cabin, not by hundreds. The cockroach stood in thought, waving his hands interrogatively, as one who talks to himself nervously. The ship at that moment received a seventh wave, lurched, and trembled. The cockroach fell. I rose, listening. I felt sure a new clamour would begin at once, showing we had reached another and critical stage of the fight. But no; the brave heart of her was beating as before. I could feel its steady pulse throbbing in our table. We were alive and strong, though laboring direfully.

9 **(a)** Place the letter **T** in the brackets for any statements which can be assumed to be **TRUE** from statements made by the writer. Place the letter **F** for any statements which may be assumed to be **FALSE.** If there is no basis for either conclusion, place an **X** in the brackets.

(1) The lump of soap acted as if it were badly frightened. (.....)

(2) The ship was quite new and tastefully furnished. (.....)

(3) The ship was being buffeted by heavy waves. (.....)

(4) The cabin was shared by two men. (.....)

(5) The ship was a sailing vessel. (.....)

(6) There were more than one hundred cockroaches in the cabin. (.....)

(7) The writer's thoughts were cheerful and his outlook was optimistic. (.....)

(8) The ship was carrying a full cargo. (.....)

(9) One of the occupants of the cabin smoked or chewed tobacco. (.....)

[OVER]

Values

10 **(b)** The words underlined in the preceding paragraph are listed below. From the five words following each, select the **ONE** that best gives its meaning as used by the author. Write the letter indicating your choice in the brackets to the right.

(1) ERRATIC

a. equitable *b.* uncertain *c.* cautious
d. incredible *e.* jocund (.....)

(2) CARAFE

a. glass *b.* barometer *c.* bottle *d.* pail *e.* keg (.....)

(3) MAD

a. annoyed *b.* indignant *c.* destructive *d.* insane
e. munificent (.....)

(4) ORIGINS

a. beginnings *b.* characteristics *c.* manners
d. conclusions *e.* epitaphs (.....)

(5) FOUNDERED

a. destroyed *b.* submerged *c.* broken *d.* shattered
e. denounced (.....)

(6) DIN

a. activity *b.* whisper *c.* replica *d.* noise
e. excitement (.....)

(7) INTERROGATIVELY

a. expressively *b.* enquiringly *c.* commandingly
d. forcefully *e.* vehemently (.....)

(8) LURCHED

a. groaned *b.* staggered *c.* shouted *d.* reviled
e. throbbed (.....)

(9) CLAMOUR

a. tumult *b.* difficulty *c.* suspense *d.* struggle
e. battle (.....)

(10) DIREFULLY

a. diligently *b.* powerfully *c.* purposefully
d. hopefully *e.* dismally (_____)

Values

5 **3.** Below is a list of titles of selections in your text, *Modern Literature for Schools.* Selecting any **FIVE** of these titles, place the number for each in the brackets to the right of the quotation which applies to it.

(1) The Yarn of the Nancy Belle
(2) Contentment
(3) Forty Singing Seamen
(4) The Browns
(5) The Ice-Cart
(6) The Gardener
(7) Bonnie George Campbell
(8) The Glove
(9) The Last Buccaneer
(10) The Warden of the Cinque Ports
(11) Horatius
(12) The Prairies

(a) And Fathers mixed with Commons,
Seized hatchet, bar, and crow,
And smote upon the planks above,
And loosed the props below. (.....)

(b) Meanwhile, without, the surly cannon waited,
The sun rose bright o'erhead,
Nothing in nature's aspect intimated
That a great man was dead. (.....)

(c) A hind who could not read or write, in hardened leather clad,
No mail to turn the levelled spear, no shining blade he had;
But dearly did he sell his life, pierced through with many a shaft,
And died beside his battle-axe, his hand upon its haft. (.....)

(d) I am here when the cities are gone;
I am here before the cities came.
I nourished the lonely men on horses
I will keep the laughing men who ride iron
I am the dust of men. (.....)

(e) As if she had tried in a crucible
To what "speeches like gold" were reducible
And finding the finest prove copper
Felt that the smoke in her face was but proper. (.....)

(f) Will ye walk into my palace?
I don't bear 'ee any malice!
One and all ye shall be welcome in the halls of Prester John! (.....)

(g) And he stirred it round and round,
And he sniffed at the foaming froth;
When I ups with his heels and smothers his squeals,
In the scum of the boiling broth. (.....)

(h) Jewels are baubles; 'tis a sin
To care for such unfruitful things;—
One good-sized diamond in a pin
Some, not so large, in rings. (.....)

Values

12 **4.** Each item in **COLUMN A** is a quotation or a short summary from one of the selections listed below. **COLUMN B** lists characters mentioned in these selections. For any **SIX** titles, fill in the number of the statement from **COLUMN A** and the number of the character from **COLUMN B** which have reference to the selection.

DO NOT fill in numbers for more than **SIX** titles.

COLUMN A	COLUMN B
(1) A rowboat with a hole in the bottom is driven by static electricity!	(1) Silas
(2) "Ah, but master, you have forgotten that I am a great hunter. If you will be stingy, I shall not trouble you more.	(2) Mrs. Ducket
(3) When he spelled out the word *Coruna*, the padlock opened in his hand.	(3) Stephen Leacock
(4) A picture of a woman enables David Armstrong to find his long-lost son.	(4) A Drummer Boy
(5) A hangman drinks mead and improvises songs about his occupation.	(5) Oo-koo-hoo
(6) "You bring Johnny home and pay me two hundred and fifty dollars in cash, and I agree to take him off your hands."	(6) Daido Lavarge
(7) "When was I ever anything but kind to him? But I'll not have the fellow back," he said. "I told him so last haying, didn't I?"	(7) Shepherd Fennel
(8) Chairmen certainly add to the difficulties faced by a public lecturer.	(8) Dicky and Tom
(9) A border-thief returns a stolen mare to show his respect for a courageous man.	(9) Kamal
(10) The bishop shows his gratitude by hiding the fish caught in a poaching expedition.	(10) Ebenezer Dorset

	COLUMN A	COLUMN B
(a) The Roll Call of the Reef	(.....)	(.....)
(b) The Three Strangers	(.....)	(.....)
(c) The Ballad of East and West	(.....)	(.....)
(d) The Widow's Cruise	(.....)	(.....)
(e) The Ransom of Red Chief	(.....)	(.....)
(f) The Death of the Hired Man	(.....)	(.....)
(g) We Have with us Tonight	(.....)	(.....)
(h) Bargaining with the Factor	(.....)	(.....)
(i) When Christmas Came to Fort Garry	(.....)	(.....)
(j) Birds of a Feather	(.....)	(.....)

Values

5. *Old Susan*

When Susan's work was done, she'd sit
With one fat guttering candle lit,
And window opened wide to win
The sweet night air to enter in.
There, with a thumb to keep her place,
She'd read, with stern and wrinkled face,
Her mild eyes gliding very slow
Across the letters to and fro,
While wagged the guttering candle flame
In the wind that through the window came.
And sometimes in the silence she
Would mumble a sentence audibly,
Or shake her head as if to say,
"You silly souls, to act this way!"
And never a sound from night I'd hear,
Unless some far-off cock crowed clear;
Or her old shuffling thumb should turn
Another page; and rapt and stern,
Through her great glasses bent on me,
She'd glance into reality;
And shake her round old silvery head,
With—"You!—I thought you was in bed!"
Only to tilt her book again,
And rooted in romance remain.

Walter de la Mare

1 **(a)** To whom would the word in line 14 be addressed if Susan had spoken them aloud?

.....

1 **(b)** To whom was she speaking the words quoted in line 22?

.....

1 **(c)** What figure of speech is the writer using in line 24?

.....

6 **(d)** In each of the following questions, put the letter of the most appropriate answer in the space to the right.

(1) Susan was apparently:

a. an elderly aunt *b.* an old servant *c.* the mother of the family
d. a visiting relative *e.* a grandmother (.....)

(2) Which statement seems most accurate?

a. Susan had a good education.
b. She possessed a rather mean, quarrelsome nature.
c. In her reading, she escaped from a rather humdrum world of reality to a world of fancy.
d. She was very strict with little boys.
e. The event took place on a cold winter evening. (.....)

Values

(3) What mood is revealed by the writer in this poem?

a. bantering *b.* scornful *c.* helpful *d.* reminiscent
e. speculative (.....)

(4) What is the writer's feeling toward Old Susan?
a. sympathetic *b.* envious *c.* benevolent *d.* disdainful
e. reverent (.....)

(5) A foot of poetry consists of one accented syllable and one or two unaccented syllables. How many feet occur in each line of the poem "Old Susan"?

a. two feet *b.* three feet *c.* four feet *d.* five feet
e. six feet (.....)

(6) If we use the letters, a, b, c, d, etc. to represent the rhyme-scheme of this poem, which series of letters correctly represents the rhyme of the first six lines?

a. abcdef *b.* ababac *c.* abbacd *d.* abcabc *e.* aabbcc (.....)

7 6. Match the name of the figure of speech in **COLUMN ONE** with its example in **COLUMN TWO** by placing its number in the space to the right.

COLUMN ONE	**COLUMN TWO**
(1) alliteration	(a) And our good Father Tiber Bare bravely up his chin (.....)
(2) metaphor	(b) One night came on a hurricane, The sea was mountains rolling (.....)
(3) simile	(c) We were only simple singing seamen, so of course we couldn't know. (.....)
(4) personification	(d) I tell you the past is a bucket of ashes I tell you yesterday is a wind gone down. (.....)
(5) irony	(e) Merry England has kissed the lips of June. (.....)
	(f) The rain fell on walls, slopes, and hedges like the clothyard shafts of Senlac and Crecy, (.....)
	(g) Now welcome, welcome Sextus, Now welcome to thy home! Why dost thou stay and turn away? Here lies the road to Rome. (.....)

Values

10 **7.**

Mr. Squirrel

I saw a brown squirrel to-day in the wood,
He ran here and there just as fast as he could;
I think he was looking for nuts for his store,
He'd found quite a lot, but he still wanted more.

He can't find much food once the winter is here,
He hides all his nuts in a hole somewhere near,
Then settles himself for a long winter sleep,
Coming out now and then for a nut and a peep.

.....
.....
.....
.....

Below are three versions of a final stanza for this poem. Read them carefully, then answer the questions which follow them by placing the correct letter in the space to the right.

A. He has a long tail that is bushy and slick,
He always sits up just as straight as a stick.
He isn't afraid of big men or small boys,
Unless they are making a good bit of noise.

B. His long bushy tail keeps him cosy and warm,
His nest's far away from the wind and the storm.
But when Springtime comes back, I think that maybe
He'll be waiting again in the woodland for me.

C. His long, thick tail keeps him snug and warm,
In his nest in a tree that is quite broad and high
We'll see him again when the spring breezes blow
Up the tree he will scamper, then down he will go.

Answer by letter—**A**, **B** or **C**.

(1) Which stanza is weakened by a poor choice of words? (.....)

(2) In which stanza does the rhyme scheme not match that used in the first two stanzas of the poem? (.....)

(3) In which stanza is the rhythm not suitable to the rest of the poem? (.....)

(4) Which stanza wanders away from the main thought, so that its use as a last stanza would leave the poem incompletely developed? (.....)

(5) Which is the best final stanza for the poem? (.....)

10

Values

8.

The Machine

I am the machine!
Born of a poet and a mathematician.
Mine is the beauty of precision,
The rhythm of motion
Exquisitely spaced for accurate performance,
The grace of balance
So that each of my parts
Moves in exact harmony with every other part.
I am thought made steel;
I am a dream come to life
in pistons and cogwheels,
in turbines and transformers.
I am a slave to serve you,
obedient, docile;
But when I am master
I kill.
There is no compassion in me;
Who worships me
I destroy.
Pity and hate are alike unknown to me—
I am the machine!

3 **(a)** Line two states that the machine is born of a poet and a mathematician. The next six lines explain why the machine is related to poetry and mathematics. In lines 4-8, find **THREE** nouns which are characteristic of both a machine and a poem.

(1) ..... (2) ..... (3) .....

2 **(b)** The writer has organized this poem so that certain ideas are made more emphatic by either their position or their arrangement in the lines. For instance, "I am the machine" is placed at two very conspicuous places—the beginning and the end of the poem. Find **TWO** other thoughts, importance of which is emphasized by position or arrangement.

(1) ..... (2) .....

3 **(c)** In the following questions, place the letter of the correct answer in the space to the right.

(1) The poem is an example of:

a. dramatic monologue *b.* free verse *c.* blank verse
d. a sonnet *e.* a ballad (.....)

(2) Which of the following people may the writer have had in mind when she wrote line 10?

a. Louis Pasteur *b.* Napoleon *c.* James Watt
d. Madame Curie *e.* Adolph Hitler (.....)

(3) Which of the following words is a synonym for the word "compassion", used in line 17?

a. irritation *b.* mercy *c.* arrogance *d.* caution
e. generosity (.....)

EXAMINATIONS, 1950

GRADE IX

ENGLISH — PART I
LITERATURE

KEY

Score

1.

3 (a) One mark for each of any THREE of the following:
four-line stanzas; simple rhyme scheme—second and fourth lines rhyme; tells a simple story; no unnecessary details are included; subjects frequently love, marriage, death; supernatural happenings—in this case birds foretell disaster; young lovers frequently die; graves, churchyards, and sextons tolling the bell

1 (b)
a funeral OR Maisie's funeral OR the pallbearers carrying Maisie's coffin to the church

1 (c)
to the funeral in the church OR her grave

1 (d)
Scotch (thou bonny bird) (six braw gentlemen) (kirkward shall carry ye)

1 (e)
3

Score

2.

9 (a)

(1) T

(2) F

(3) T

(4) T

(5) F

(6) T

(7) F

(8) X

(9) T

Score

10 (b) One mark for each:

(1) b

(2) c

(3) d

(4) a

(5) b

(6) d

(7) b

(8) b

(9) a

(10) e

5

Score

5 **3.** One mark for each of FIVE correct answers:

(a)

11

(b)

10

(c)

4

(d)

12

(e)

8

(f)

3

(g)

1

(h)

2

Score

12 **4.** Two marks for each of any SIX of the following:

	COLUMN A	COLUMN B
(a)	**3**	**4**
(b)	**5**	**7**
(c)	**9**	**9**
(d)	**1**	**2**
(e)	**6**	**10**
(f)	**7**	**1**
(g)	**8**	**3**
(h)	**2**	**5**
(i)	**4**	**6**
(j)	**10**	**8**

Score

5.

1 (a)

The characters in the story.
OR The people in the book.

1 (b)

The writer. OR The writer when he was a boy.

1 (c)

Alliteration OR Metaphor

6 (d) One mark for each:

(1)

b

(2)

c

8

Score

(3) **d**

(4) **a**

(5) **c**

(6) **e**

7 **6.** One mark for each:

(a) **4**

(b) **2**

(c) **1**

(d) **2**

(e) **4**

(f) **3**

(g) **5**

Score

10 **7.** Two marks for each:

(1) **A**

(2) **C**

(3) **C**

(4) **A**

(5) **B**

Score

8.

3 (a) One mark for each:

(1) rhythm (2) balance
(3) harmony

2 (b) One mark for each

(1) I kill (2) I destroy

3 (c) One mark for each:

(1)

b

(2)

c

(3)

b

CANDIDATE'S NUMBER

(For the use of the Department only)

DEPARTMENT OF EDUCATION ALBERTA

HIGH SCHOOL ENTRANCE EXAMINATION BOARD

DEPARTMENTAL EXAMINATIONS, 1950

GRADE IX

GENERAL SCIENCE AND HEALTH EDUCATION

Time—2½ hours.

Note—This paper consists of THREE SECTIONS.

Distribute your time to best advantage, reading the paper, answering the questions, and reviewing the work you do.

READ THE INSTRUCTIONS TO EACH SECTION CAREFULLY.

Do not write your name on either the booklet or the separate answer sheet.

DO NOT FOLD EITHER THE BOOKLET OR THE ANSWER SHEET.

Place answer sheet on top of booklet and insert both in the same envelope.

1	2	3

(For use of sub-examiners only)

Questions 1 to 106 inclusive carry a value of 1 mark each.

SECTION A

Section A of the paper contains questions 1 to 50 inclusive. Answers to these questions are to be recorded on the separate ANSWER SHEET which will be given you by the Presiding Examiner. Each question has five suggested answers, only one of which is correct. Select the correct answer in each case and record your choice on the separate answer sheet as shown in the following sample:

SAMPLE:	Answers	Answer Page
The most abundant gas in the atmosphere is	*a.* oxygen *b.* nitrogen *c.* hydrogen *d.* argon *e.* carbon dioxide	

Since the correct answer is nitrogen, the space marked *b* on the answer sheet is filled in. Be sure to mark your answer distinctly, using a soft lead pencil and making a heavy black mark. If you wish to change your answer, erase your first mark completely.

1. Which of the following would be classed as part of your artificial environment?

1. *a.* another person *b.* an animal *c.* a railway train *d.* air *e.* water

2. Which of the following is a general property of matter?

2. *a.* color *b.* shape *c.* weight *d.* malleability *e.* elasticity

3. An example of a simple machine is

3. *a.* a siphon *b.* a lift pump *c.* a thermometer *d.* a telephone *e.* a pulley

4. An example of potential energy is

4. *a.* a strong wind
b. an unlighted electric light bulb
c. a swiftly running stream
d. a tank full of gasoline
e. a moving car

5. In doing work it is often necessary to overcome the effects of

5. *a.* inertia *b.* potential energy *c.* magnetism *d.* buoyancy *e.* matter

6. An electric motor is used to change electrical energy to

6. *a.* heat energy
b. mechanical energy
c. chemical energy
d. potential energy
e. light energy

7. Friction between the moving parts of a machine may be reduced by the use of

7. *a.* friction tape *b.* an inclined plane *c.* pulleys *d.* levers *e.* lubricants

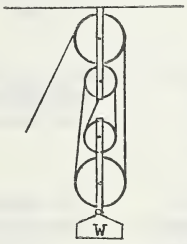
8. Which of the following is an example of a chemical change?

8. *a.* water is boiled
b. a candle burns
c. frost forms on a window in cold weather
d. an iron rod expands when heated
e. salt is dissolved in hot water

9. According to the scientific meaning of work, in which of these examples is there no work being done?

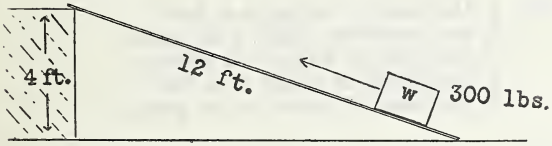
9. *a.* a boy stands holding a pail of water
b. a baseball player catches a ball
c. a car travels along the road
d. a man raises a sack of grain to his shoulder.
e. a boy throws a football

10. The mechanical advantage of the system of pulleys below is



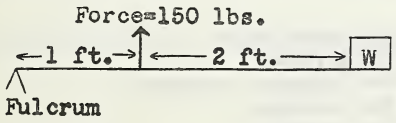
10. *a.* 2 *b.* $\frac{1}{2}$ *c.* 4
d. 6 *e.* $\frac{1}{4}$

11. Disregarding the effects of friction, what force would be required to move the weight up the inclined plane shown below?



11. *a.* 150 lbs. *b.* 50 lbs.
c. 600 lbs. *d.* 30 lbs.
e. 100 lbs.

12. In the diagram of the third class lever below, what weight could be lifted?



12. *a.* 75 lbs. *b.* 50 lbs.
c. 300 lbs. *d.* 450 lbs.
e. 100 lbs.

13. Compared with an equal volume of cold air, warm air is

13. *a.* lighter *b.* drier
c. heavier *d.* more moist
e. the same weight

14. The force which lifts the water in an ordinary lift pump is furnished by

14. *a.* the piston
b. the valves
c. expansion of the water
d. air pressure
e. the cylinder

[OVER]

15. Kerosene rising upward in the wick of a lamp is an example of

15. *a.* osmosis *b.* air pressure *c.* evaporation *d.* transpiration *e.* capillarity

16. An instrument which measures atmospheric pressure is the

16. *a.* thermometer *b.* hygrometer *c.* anemometer *d.* barometer *e.* hydrometer

17. An important cause of winds is

17. *a.* uneven heating of the air *b.* the kind of clouds formed *c.* the season *d.* rain or snow *e.* lack of trees for protection

18. When the relative humidity of the air is high, it means that the air is

18. *a.* warm *b.* moist *c.* cool *d.* dry *e.* heavy

19. The scientist who devised a means of measuring air pressure was

19. *a.* Faraday *b.* Bell *c.* Edison *d.* Torrecelli *e.* Marconi

20. The water which covers a large part of the earth's surface is known as the

20. *a.* troposphere *b.* hemisphere *c.* hydrosphere *d.* stratosphere *e.* atmosphere

21. A method often used to make drinking water safe from disease germs is

21. *a.* chlorination *b.* filtration *c.* aeration *d.* sedimentation *e.* evaporation

22. The water table is

22. *a.* the level of water in a dam *b.* an aquarium filled with water *c.* the level of water in a stream *d.* the depth of water in a well *e.* the level of water in the ground

23. A cubic foot of water weighs approximately

23. *a.* 72.5 lbs. *b.* 100 lbs. *c.* 62.5 lbs. *d.* 37.5 lbs. *e.* 55 lbs.

24. A device that is often used to harness water power is

24. *a.* the commutator *b.* the turbine *c.* the Bessemer converter *d.* the generator *e.* the rheostat

25. Water has a maximum density at a temperature of

25. *a.* 0° C *b.* 32° F *c.* 4° C *d.* 212° F *e.* 100° C

26. The Pelton wheel is most suitable for developing water power

26. *a.* when there is a large volume of water *b.* when the stream flows swiftly *c.* when there is a small flow of water with a low fall *d.* when there is a small flow of water with a high fall *e.* when there is no fall of water

27. An electric generator produces electricity because

27. *a.* coils of wire move through the fields of permanent magnets
b. there is friction when the generator revolves
c. electromagnets are used to create the electricity
d. it is attached to a battery
e. a chemical reaction takes place

28. To prevent damage to the electric wiring in a house due to overloading of the circuit, it is provided with

28. *a.* switches *b.* fuses
c. insulated wires *d.* a meter
e. an electric arc

29. A non-conductor of electricity is

29. *a.* copper *b.* aluminum
c. platinum *d.* steel
e. glass

30. When electrons move through a conductor, they produce

30. *a.* chemical energy
b. mechanical energy
c. friction
d. an electric current
e. resistance

31. The greatest source of heat and energy for the earth is

31. *a.* water power *b.* the sun
c. coal *d.* natural gas
e. oil

32. The chief reason that summer is warmer than winter in Alberta is

32. *a.* the earth is farther from the sun in winter
b. the sun is brighter in summer
c. the sun's rays strike the surface more directly in summer
d. snow reflects most of the sun's heat in winter
e. the ground is frozen in winter

33. Zero degrees on the Centigrade thermometer (0° C) is the same temperature as

33. *a.* 32° F *b.* 0° F
c. —32° F *d.* 100° F
e. 212° F

34. Light from the sun reaches the earth

34. *a.* instantaneously *b.* in 5 minutes
c. in 8 minutes *d.* in 8 seconds
e. in 5 seconds

35. An example of an internal combustion engine is

35. *a.* steam engine *b.* electric motor
c. turbine *d.* dynamo
e. automobile motor

36. On the compression stroke of a four-cycle gasoline motor

36. *a.* the intake valve is open
b. both valves are closed
c. the exhaust valve is open
d. both valves are open
e. the piston is moving downward

[OVER]

37. A machine which operates on compressed air is

37. *a.* steam engine *b.* hydraulic press *c.* pneumatic drill *d.* gasoline engine *e.* hydrometer

38. A substance through which light will not pass is said to be

38. *a.* translucent *b.* oblique *c.* transparent *d.* opaque *e.* inpregnable

39. An eclipse of the moon can occur only

39. *a.* once each year *b.* at full moon *c.* during the winter season *d.* at new moon *e.* during the first quarter of the moon

40. A burning candle gives off light because

40. *a.* the flame contains glowing particles of carbon *b.* hydrogen in the flame burns with a bright light *c.* the wick becomes incandescent *d.* the unburned gases in the centre of the flame glow brightly *e.* oxygen glows during combustion

41. The work of keeping a city or town clean and free from disease germs is called

41. *a.* hygiene *b.* pasteurization *c.* vaccination *d.* immunization *e.* sanitation

42. A disease that may be spread by the use of unpasteurized milk is

42. *a.* cancer *b.* pneumonia *c.* measles *d.* tuberculosis *e.* rheumatism

43. The most complete food we have is

43. *a.* meat *b.* eggs *c.* milk *d.* bread *e.* cheese

44. A disease that may be prevented by inoculation is

44. *a.* diphtheria *b.* smallpox *c.* beri-beri *d.* measles *e.* tuberculosis

45. The scientist who is famous for the discovery of insulin as a treatment of diabetes is

45. *a.* Pasteur *b.* Banting *c.* Burbank *d.* Fleming *e.* Harvey

46. The modern era in medicine began with

46. *a.* the use of X-rays *b.* the discovery of vitamins *c.* the discovery of circulation of blood in the body *d.* the invention of the stethoscope *e.* the discovery of bacteria

47. A disease caused by deficiency of vitamin D is

47. *a.* scurvy *b.* anaemia *c.* rickets *d.* neuritis *e.* rheumatism

48. A food which is chiefly carbohydrate is

48. *a.* butter *b.* bread *c.* cheese *d.* eggs *e.* milk

49. Which of the following is a test of the bacteria content of milk?

49. *a.* methylene blue test *b.* Babcock test *c.* Schick test *d.* tuberculin test *e.* sediment test

50. Which of the following statements is true of alcohol?

50. *a.* it is an energy producing food *b.* it aids digestion *c.* it is a narcotic *d.* it aids the user in doing his work *e.* it helps to keep the user warm in cold weather

SECTION B

Section B consists of several sets of questions which are to be answered on the separate ANSWER SHEET.

In Set 1 to Set 4 inclusive, each set consists of three Observations and a number of Related Ideas.

Some of the Related Ideas, but not all of them, are related to one of the three observations listed. Select as your answer the one Observation which best explains the Related Idea which you are considering, and mark this answer in the appropriate space on the separate ANSWER SHEET as shown in the following sample:

SAMPLE:

Observations	*Related Ideas*	Answer Page
a. Energy can be changed from one form to another. *b.* Energy is the ability to do work. *c.* Energy can be stored.	1. The battery in a car is charged. 2. An electric current produces light in a light bulb. 3. Copper is a good conductor of electricity. 4. Wind can do work when it turns a windmill.	1. *a* *b* *c* (*c*) 2. *a* *b* *c* (*a*) 3. *a* *b* *c* 4. *a* *b* *c* (*b*)

NOTE—There is no answer for Related Idea No. 3, since none of the observations explains it.

Be sure to mark your answers distinctly, using a soft lead pencil and making a heavy black mark. If you wish to change your answer, erase your first mark completely.

Set No. 1 (to be answered in blanks 51-60 inclusive)

Observations	*Related Ideas*
a. Liquids exert a buoyant force on objects immersed in them equal to the weight of liquid displaced. *b.* Convection currents are caused in liquids by unequal heating. *c.* Pressure exerted by a liquid is proportional to the depth of the liquid.	51. Some towns have a water tower set high above the buildings. 52. A ship made of steel will float. 53. Divers wear strong metal helmets when working under water. 54. Homes are sometimes heated by hot water heating systems. 55. Boiling water produces steam. 56. It is easier to swim in the salt water of the ocean than in a fresh water lake. 57. Ocean currents are found in many parts of the world. 58. A submarine must flood some of its compartments in order to submerge. 59. A dam is built thicker at the base than at the top. 60. Divers sometimes wear heavy weights attached to the soles of their shoes.

Set No. 2 (to be answered in blanks 61—69 inclusive)

Observations

a. Some substances conduct heat more readily than others.
b. Most substances expand when heated.
c. Heat is produced by friction.

Related Ideas

61. An automobile tire becomes softer in cold weather.
62. Scratching a match ignites it.
63. Wood is used as a fuel.
64. One may burn one's hands in sliding down a rope.
65. We measure temperature with a thermometer.
66. Cooking utensils often have wooden handles.
67. A thermostat is used to control the temperature of a building.
68. Electricity produces heat in an electric iron.
69. Steam pipes are sometimes wrapped with asbestos to prevent loss of heat.

Set No. 3 (to be answered in blanks 70—78 inclusive)

Observations

a. Inertia is a general property of matter.
b. Objects are attracted towards the earth by gravity.
c. Friction is the resistance to one surface sliding over another.

Related Ideas

70. Applying the brakes helps to stop a moving automobile.
71. A moving bicycle does not tip over.
72. Rubber-soled shoes are worn when playing games in the gymnasium.
73. It requires more effort to walk up a stair than to walk down.
74. Glass is brittle and breaks easily.
75. Cars often skid sideways when going too fast around a curve.
76. A sponge will absorb water.
77. Work must be done to raise bricks to the top of a building.
78. Standing passengers lose their balance when a street car goes around a curve.

[OVER]

Set No. 4 (to be answered in blanks 79—86 inclusive)

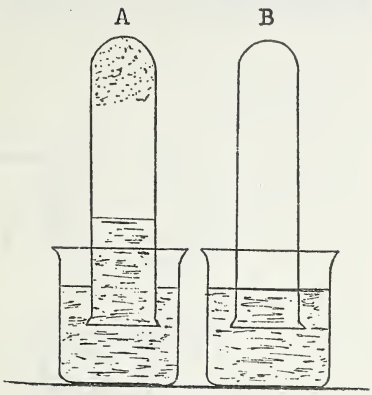
Observations

a. Micro-organisms require moisture, warmth, and food, and grow best in the dark.
b. Some micro-organisms are beneficial to man.
c. Micro-organisms are destroyed by high temperatures.

Related Ideas

79. Bacteria multiply by simple cell division.
80. The law requires that all milk sold must be pasteurized.
81. The growing of legume crops enriches the soil.
82. Yeast is used in making bread.
83. Water from an unreliable source should be boiled before being used for drinking.
84. Fresh meats are kept in the refrigerator until used.
85. Vitamin C in the diet prevents scurvy.
86. Dried apples may be kept for long periods of time without spoiling.

Set No. 5—Read the following description of an experiment carefully. Then follow the directions given below.



EXPERIMENT

The inside of test tube A was moistened and some iron filings poured into it. The filings adhered to the moist tube. The test tube was then inverted in a beaker of water. The level of water in the tube was marked, and it was allowed to stand for 24 hours. The same procedure was followed with tube B, but the iron filings were left out.

After 24 hours the level of the water in tube A had risen about one-fifth of the distance to the top of the tube, and the iron filings had turned a reddish color. There had been no change in tube B.

Both tubes were removed carefully and the air still in each tube was tested with a burning splint. When inserted in tube A the burning splint went out at once, but in tube B it continued to burn for a short time.

NOTE—It has been previously shown that the oxygen in the air supports combustion.

Consider each statement below and on the separate ANSWER SHEET mark your answers as follows:

(*a*) if the evidence from the experiment makes the statement true.

(*b*) if the evidence from the experiment makes the statement false.

(*c*) if the evidence from the experiment indicates that the statement is probably true.

(*d*) if there is insufficient evidence in the experiment to decide if the statement is true or false.

SAMPLE:

1. Some of the air disappeared from tube B.
2. The rusting of iron used oxygen from the air.

Answer Page

1. *a* *b* *c* *d*
2. *a* *b* *c* *d*

(To be answered in blanks 87—96 inclusive)

87. The rusting of iron is a form of slow oxidation.
88. The water stopped rising in tube A because the oxygen in the tube had been used up.
89. The air left in tube A is chiefly carbon dioxide.
90. The rusted iron is heavier than it was before rusting.
91. All of the air that was in tube A at the beginning of the experiment would support combustion.
92. Heat was produced when the iron rusted.
93. About 20% of the air is oxygen.
94. Moisture is needed to cause rusting of iron.
95. Tube B is not a necessary part of the experiment.
96. Air pressure caused the air to rise in tube A.

[OVER]

Set No. 6—Below are listed nine pairs of events. Read them over carefully and on the separate ANSWER SHEET mark your answers as follows:

(*a*) if the first event is probably the sole cause of the second.

(*b*) if the first event is one of a number of causes of the second.

(*c*) if both events are the result of the same cause.

(*d*) if the events are unrelated.

SAMPLE:

1. An electric circuit was closed; lights on the circuit lighted.

   Since closing the circuit is one of the several causes when lights go on, the correct answer is (*b*).

Answer Page

1. *a* *b* *c* *d*

(To be answered in blanks 97—106 inclusive)

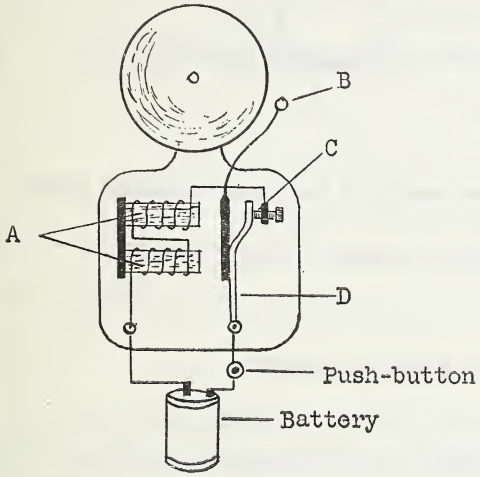
97. The barometer showed a drop in pressure; there was a storm that night.
98. A girl broke her mirror; she failed her next examination.
99. A city decided to chlorinate its water supply; there was a definite drop in the number of typhoid cases in the city.
100. The air was very dry; plants and flowers wilted.
101. The branches of a tree waved to and fro; a nearby windmill turned.
102. A man working in the sun did not perspire; he was overcome by the heat.
103. There was a thunderstorm; at the same time there was much static on the radio.
104. Puffs of steam were seen; the whistle of the train was heard immediately afterwards.
105. The brakes on the car were defective; the motor would not run.
106. A drop of iodine was added to a test tube containing a starch solution; the solution in the tube turned violet in color.

SECTION C

Values

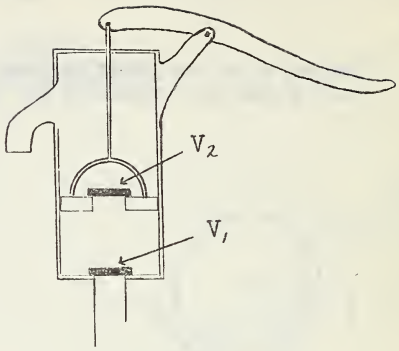
Section C of the paper contains questions 107 to 111 inclusive. The answers for each part should be written in the spaces provided in the booklet.

10 107. Referring to the accompanying diagram of an electric bell, explain clearly how the bell operates when the circuit is closed. In your answer, indicate each successive step in its operation.



Values

108. The diagram shows a lift pump at rest, with both valves closed.



2 (*a*) What happens to each valve when the handle of the pump is pushed down?

.....

.....

2 (*b*) What happens to each valve when the handle is raised?

.....

.....

10 109. On the line after each item in Column B write the *number* of the item in Column A which matches it. There are more items in Column A than are required to complete Column B. Omit those that do not match.

Column A	*Column B*	
(1) Schick	(*a*) Discovered the x-ray	(.....)
(2) Lister	(*b*) Invented the microscope	(.....)
(3) Madam Curie	(*c*) Discovered vaccination	(.....)
(4) Mendel	(*d*) Invented the telescope	(.....)
(5) Roentgen	(*e*) Used antiseptic surgery	(.....)
(6) Galileo	(*f*) Proved that a species of mosquito carried Yellow Fever	(.....)
(7) Wright Brothers	(*g*) Discovered laws of heredity	(.....)
(8) Jenner	(*h*) Developed a test for susceptibility to diphtheria	(.....)
(9) Watt	(*i*) Helped to discover radium	(.....)
(10) Leeuwenhoek	(*j*) Flew the first airplane	(.....)
(11) Reed		
(12) Saunders		

Values

110. Answer each of the following questions by means of a *single concise sentence.*

2 (*a*) What is meant by indirect lighting?

.....

.....

.....

2 (*b*) How would one overcome temporary hardness in water?

.....

.....

.....

2 (*c*) Define British Thermal Unit (B.T.U.).

.....

.....

.....

2 (*d*) On what does the pitch of sound depend?

.....

.....

.....

2 (*e*) How is the fuel ignited in the cylinder of a Diesel engine?

.....

.....

.....

2 (*f*) What action does saliva have on food?

.....

.....

.....

2 (*g*) What is the purpose of the "March of Dimes" campaign?

.....

.....

.....

Values

2 (*h*) In case of an accident, how would you recognize that an artery had been cut?

.....

.....

.....

2 (*i*) What is meant by a compound fracture?

.....

.....

.....

2 (*j*) Who is the Minister of Health for Alberta?

.....

.....

.....

111. Complete the following blanks (1) by giving *three foods* which are well known and common sources for each substance listed, and (2) by giving *one function or use* of each substance in the body:

4 (*a*) Protein:

(1) ..... Function: .....

(2) ....

(3) ....

4 (*b*) Calcium:

(1) ..... Function: .....

(2) ....

(3) ....

4 (*c*) Iron:

(1) ..... Function: .....

(2) ....

(3) ....

GENERAL SCIENCE & HEALTH EDUCATION — GRADE IX — 1950

(For the use of the Department only)

KEY

Section A

	a	b	c	d	e
1			■		
2			■		
3					■
4				■	
5	■				
6		■			
7					■
8		■			
9	■				
10			■		
11					■
12		■			
13	■				
14				■	
15					■
16				■	
17	■				
18		■			
19				■	
20			■		
21	■				
22					■
23			■		
24		■			
25			■		
26				■	
27	■				
28		■			
29					■
30				■	
31		■			
32			■		
33	■				
34				■	
35					■
36		■			
37				■	
38				■	
39		■			
40	■				
41					■
42	■				
43				■	
44	■				
45		■			
46					■
47				■	
48		■			
49	■				
50			■		

Section B

	a	b	c	d
51			■	
52				
53			■	
54		■		
55	■		■	
56	■			
57		■		
58	■			
59			■	
60	■			
61		■		
62			■	
63	■		■	
64			■	
65		■		
66	■			
67		■		
68			■	
69				
70			■	
71	■			
72			■	
73		■		
74			■	
75				
76		■		
77				
78	■			
79	■	■	■	
80			■	
81				
82		■		
83			■	
84	■			
85	■	■	■	
86	■			
87	■			
88	■			
89				■
90			■	
91		■		
92				■
93	■			
94				■
95		■		
96	■			
97				
98				■
99	■			
100		■		
101			■	
102				
103	■			
104			■	
105				■
106	■			

EXAMINATIONS, 1950

GRADE IX

GENERAL SCIENCE AND HEALTH

EDUCATION

KEY

Score

10 **107.** Two marks for each step:

In the answer reference should be made to the following five steps:

(1) **Closing the circuit causes the electro-magnets at A to become magnetized.**
(2) **The clapper B is pulled towards the electro-magnets and the clipper strikes the bell.**
(3) **The circuit is broken at the contact points C, and this causes the electro-magnets to lose their magnetism.**
(4) **The spring D returns the clapper to its original position.**
(5) **Closing the circuit at C causes the process to repeat itself while the push button is pressed.**

Score

108.

2 (a)

When the handle is pushed down, V_1 is open and V_2 is closed.

2 (b)

When the handle is raised, V_1 is closed and V_2 is open.

10 **109.** One mark for each:

(a)	**5**
(b)	**10**
(c)	**8**
(d)	**6**
(e)	**2**
(f)	**11**
(g)	**4**
(h)	**1**
(i)	**3**
(j)	**7**

Score

110.

2 (a)

Light from some source is reflected from some surface in order to provide lighting.

2 (b)

To overcome temporory hardness in water the water should be boiled.

2 (c)

A British Thermal Unit is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

2 (d)

The pitch of sound depends on the number of vibrations per second of the object causing the sound.

2 (e)

The fuel in the cylinder of the Diesel engine is ignited by the heat formed by compression within the cylinder.

2 (f)

When mixed with foods containing starch it changes the starch to sugar.

2 (g)

The purpose of raising money in this campaign is to combat poliomyelitis.

Score

2 (h)

A cut artery can be recognized by the bright red color of the blood flowing from the wound and the fact that it comes in spurts.

2 (i)

In a compound fracture the bone is broken and the broken ends of bone have punctured the flesh.

2 (j)

Alberta's Minister of Health is the Hon. Dr. W. W. Cross.

111. One mark for each point.

4 (a)

(1) **meat**
(2) **eggs**
(3) **cheese**

Building or repairing body cells.

4 (b)

(1) **milk**
(2) **eggs**
(3) **green vegetables**

Needed for building bones and teeth.

4 (c)

(1) **liver**
(2) **eggs**
(3) **green vegetables**

Provides material for the red corpulscles of the blood.

(Any other commonly accepted foods containing these substances should be accepted.)